

The Mining And Metallurgical Journal

VOL. XIX. No. 4

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May 15, 1898,

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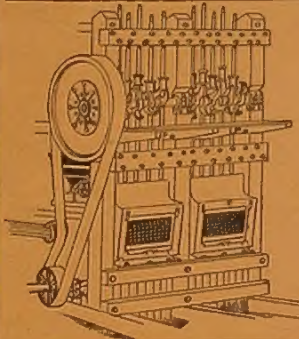
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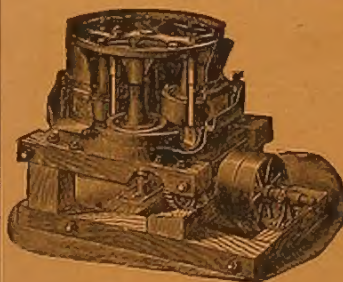
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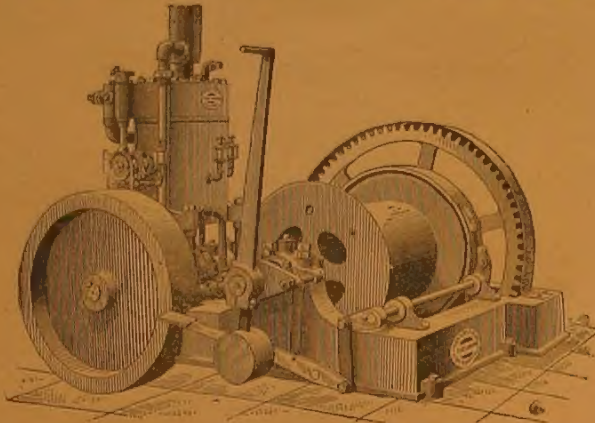
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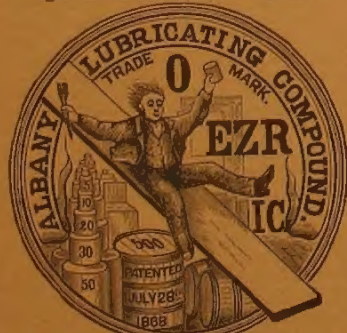
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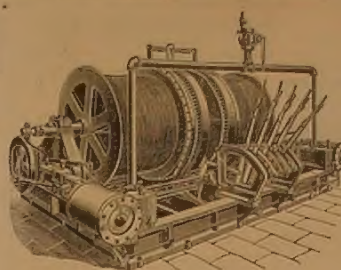
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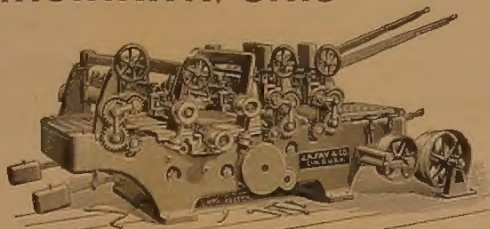
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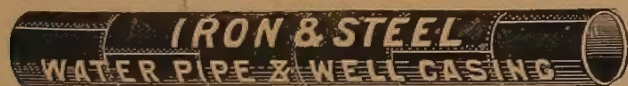


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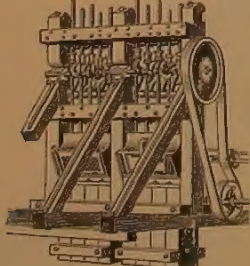
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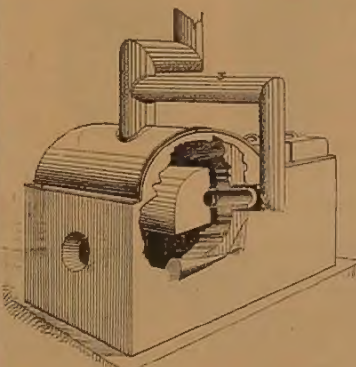
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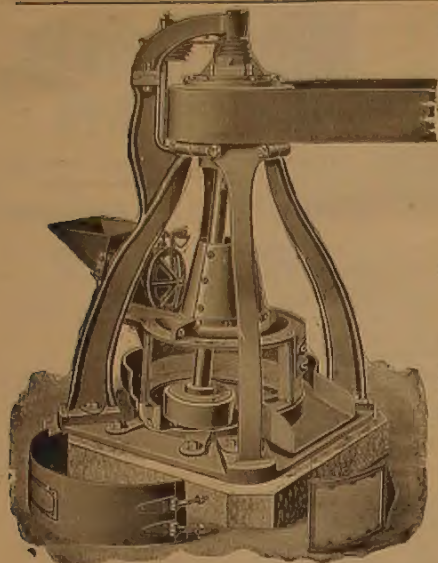
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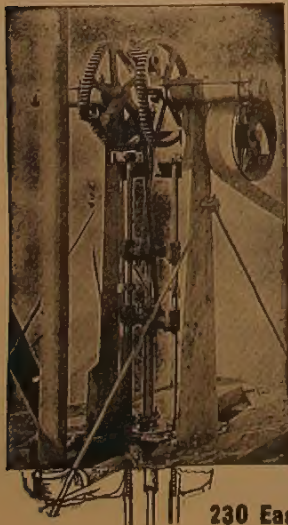
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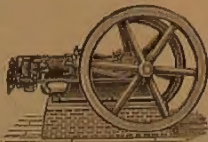
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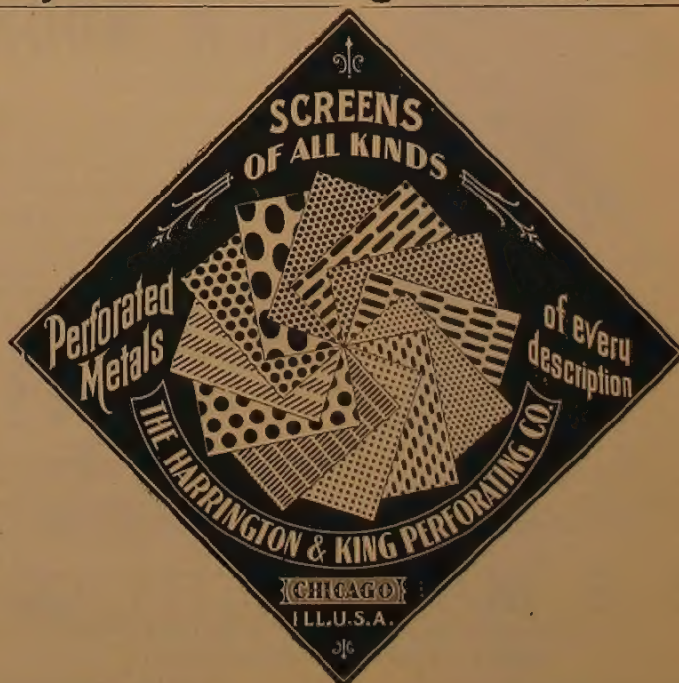
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The effects of the war with Spain are already being felt in the mining industry. The first branch to be benefitted by it is the iron trade with large orders from manufacturers. This is the natural result of the activity in the iron ship-building trade and for the supply of heavy guns. As Spain is a large producer of copper ore it is almost certain to increase the price of that metal, especially so if riots continue there or the Spanish ports are blockaded by American warships. The Spanish copper mines are mostly owned by British

and French capital and have been a paying investment for the owners for the period since their sale to present companies about thirty years ago, and paid last year dividends amounting to from twenty to twenty-five per cent.

The ultimate result will be to enlarge the market for U. S. manufactured products with the Philippine Islands, Cuba and Porto Rico in exchange for tropical products. The spread of American civilization, capital and enterprise into these islands when free from the yoke of Spain, will play an important part in their future history.

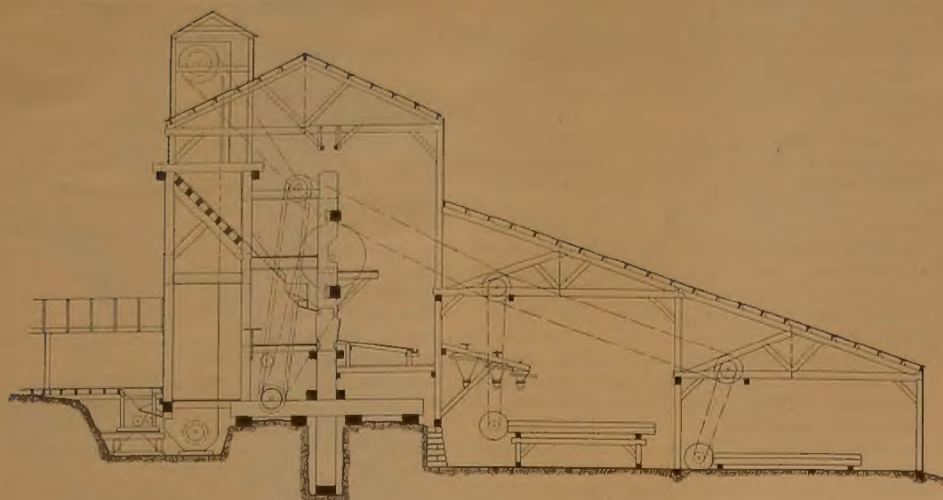
The time has arrived when the United States must establish a foreign and colonial policy in spreading trade and civilization into the islands of the Pacific and South American countries. Irrespective of the good such a policy will have from the benefits to be conferred on the native population our commercial position and large manufacturing and mining interests demand such an outlet for the rapidly increasing long list of superior articles of manufacture which the inventive skill of our people has produced.

During the past few years manufacture of gas for domestic use has been threatened with a formidable opposition or revolution of the industry by the discovery and later improvements in the manufacture of acetylene. This is accomplished in the electric furnace by using refuse coal and limestone, which when smelted by the intense heat, combine to form a solid black material or carbide of lime. The decomposition of this substance in water results in the liberation of acetylene gas. This invention and process, which has been covered by patents, seems on the point of being now superseded by the invention of a Chicago ironworker, who claims to have found a new use for blast furnace slag, a waste product in the smelting of iron ores. He proposes to add solid carbonaceous material to the slag, and form a carbolite or a carbide of calcium, aluminum and silicon. From the carbolite will be produced ethylene gas, which is claimed to be an improvement on acetylene, which is more liable to decomposition. The inventor claims that the profits from this by-product will reduce the cost of pig iron one-half, and effect a saving to the iron smelting industry of many millions of dollars annually. It is claimed that ethylene gas from this source will cost fifty per cent. less than acetylene, and will produce a much better light.

If these claims are founded on fact, the discovery will revolutionize the manufacture of iron, and has special interest to the mining industry of California and Utah. California possesses inexhaustable resources in the form of rich hematite and magnetic iron ores in many parts of the State, and with the aid of cheap coal or coke from Utah, the smelting of these ores to produce pig iron in the blast or oven hearth furnaces is possible. This industry once established, it may be possible to utilize the waste slag as is proposed to be done in Chicago, by the use of another California mineral product which is not at present of any value. That is the heavy asphaltum products, solid and semi-solid, and and too impure for refining or pumping purposes, which abound in all oil districts on the Pacific coasts. Further development of this discovery will be watched with interest, as it would give our cities and towns a much needed source of cheap gas supply, as well as making the smelting of our iron ores possible.

Capital invested in mining has to yield interest in proportion and in competition with investments made in other lines of trade. The attention given to mining by capital is in proportion to the gain made from such investment. If the industry is prosperous and the profits large in a certain class of ore, the required capital is easily obtained for new enterprises of a similar kind. The evil effects of over-capitalization of even a good property has the effect of heaping a burden on it greater than it can bear. The first question demanded by capital is, "How much will it pay as an investment?" A mining enterprise requires capital to the extent of first to open the mine, then to put in the necessary plant for treating or reducing the ore, and also a sufficient amount of working capital to carry on the business of mining and marketing the product. No fixed rule can be laid down to regulate the amount of capital required, as each individual case is different; but it should not exceed the sum required under the three items of necessary expenditure to enable the concern to be carried on in a successful manner. To correctly estimate these items requires long experience by the mining engineer intrusted with the work. The too common custom of placing the capital of the company at so many millions of dollars has the effect of driving away the cautious and conservative investor to other channels of trade where moderate capital is required. Unless the enterprise is sufficiently large to pay dividends on one or several millions of dollars there is no prospect of receiving dividends. In such a case it is a stock gambling concern floated under the title of a mine. A State or Federal tax on the nominal capital of all incorporated companies, increasing as the capital increases, would seem to be the best way of limiting this evil custom. Excessive amount of capital on paper is one of the causes for a uniform law or Federal statute to regulate incorporated companies in all States.

The first duty of the intelligent prospector for minerals is to test or investigate the properties of those of strange appearance and of doubtful composition. Therein lies the first steps to success and fortune, for to neglect it is the sure road to failure in the business. The useful and valuable minerals are not alone the ores holding the precious metals gold and silver, for those of less value are often a much better paying proposition, and form a much larger class in almost all countries. The external appearance of many ores and minerals of economic value is so deceiving that it is not to be wondered at that those who are not well acquainted with such so often pass them by as of no value. Indeed, it is a quite common occurrence for those of superior mineralogical knowledge to be deceived in the identity of a strange mineral at first sight, that the mistakes of the novice can easily be overlooked in this regard. It is sometimes the want of sufficient knowledge of the non-metallic minerals and valuable ores of the rare metals which are of commercial value that is the cause of many prospectors not receiving the due reward of their labors. If any of our numerous subscribers and readers have such specimens on hand the JOURNAL will take pleasure in naming or telling the party who sends us a piece by sample just what the mineral is and the opportunity of making the discovery one of profit to the owner if the district is given with distance to railroad and other necessary particulars.



50 Stamp Mill for Free Milling Gold Ores built for The Pennsylvania M. & M. Co., Boulder Co., Colo.

MODERN METHODS OF ORE TREATMENT.

From the phenomenal strides in gold and silver metallurgy and the economical methods of extracting the precious metals from their ores, which were practically developed since the beginning of the last decade of this century, have been the means of recovering hundreds of millions in gold, that heretofore could not be mined and milled at a profit.

The success or failure of quartz mining operations is frequently due to the selection of the persons to attend to the reduction and amalgamation of the ores. A trick of the trade of amalgamators is that a certain air of mystery is thrown around their operations, "there is nothing in it." To be or become a good amalgamator requires a person to have cool judgement, a thorough knowledge of the character and value of ores and of the chemical or other combinations of their metallic and mineral inclosures and a thorough practical acquaintance with the construction, principles and operation of all of the machinery and appliances of a mill or reduction works, and especially should he have his eyes and ears open at all times. The power used to drive the machinery should have his first care and attention, that it is ample and suitable, and economically arranged for the purpose; that the whole is under his immediate control by signals, brakes or levers; that no irregularities of speed or motion in any one part can be occasioned by any additional power required to drive another, or any change of power occasioned by the slackening down or breaking of one part affect the speed of that in operation, for it is of the utmost importance that, in order to secure perfect reduction and amalgamation of ores, the stamping, concentrating and grinding must be constant, regular and unintermitting from the beginning of a run to its close.

Most gold ores will yield only a portion of their contents to the simple milling process, because some of the precious metal is in combination with sulphur and baser metals. It is for the purpose of saving these "sulphurets," as they are generally called, that Concentrators are placed below the copper plates. The concentrates are subsequently treated by the chlorination process or are sold to smelting works.

It is often the case that gold ores do not carry sufficient, if any, sulphurets to warrant the use of concentrators, in which case the portion of mill covering concentrators is

omitted, and, as will be seen, can be easily added should subsequent developments in the mine require them.

The mills which are illustrated and described in this issue show the general design and give a fair idea of the machinery required in the best known modern methods of ore treatment such as Gold and Silver Milling, Concentration, the Cyanide and Chlorination Processes, Ore Sampling, etc. The mills used to illustrate these various Processes were designed and fitted out by the F. M. Davis Iron Works Co. of Denver, Colo., and are selected for illustration merely as being fairly typical mills of their kind.

GOLD MILLING.

The majority of stamp mills are built on a hillside and, in the typical mill, the ore enters at the upper end of the building and is dump-

ed over an inclined grizzly to the rock breaker floor. The ore is then passed through the breaker into the ore bins.

The mill of The Pennsylvania M. & M. Co., is built on level ground, and the ore is delivered to the sampling mill (not shown) where it is crushed sampled and elevated to the storage bins.

From these bins the ore is drawn into cars and trammed to the hoppers of the automatic feeders. These feeders discharge into the boots of the elevators which raise the ore to the stamp mill supply bins and are used to prevent the chocking of the elevators. From these bins the ore is drawn through inclined chutes, controlled by ore gates, as fast as required into ore feeders which supply the stamps automatically. In this mill the chief values are in the concentrates, and the mortars are of double issue type without inside copers.

The table in front of each mortar is covered with a silver plated copper plate. The free gold is caught on these plates by amalgamation with quicksilver.

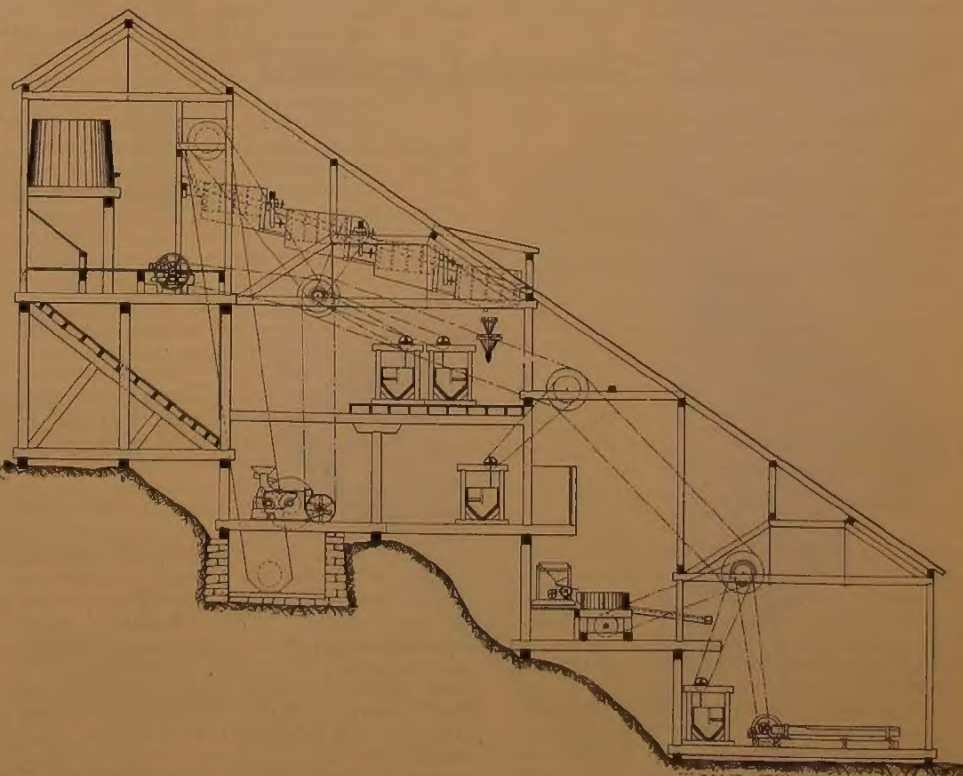
From the plates the pulp passes to hydraulic sizers where it is separated into various sizes and fed to Wilfley Concentrators.

In California the values in the concentrates are usually extracted by the old vat system of chlorination. In Colorado the Concentrates are shipped to the smelters.

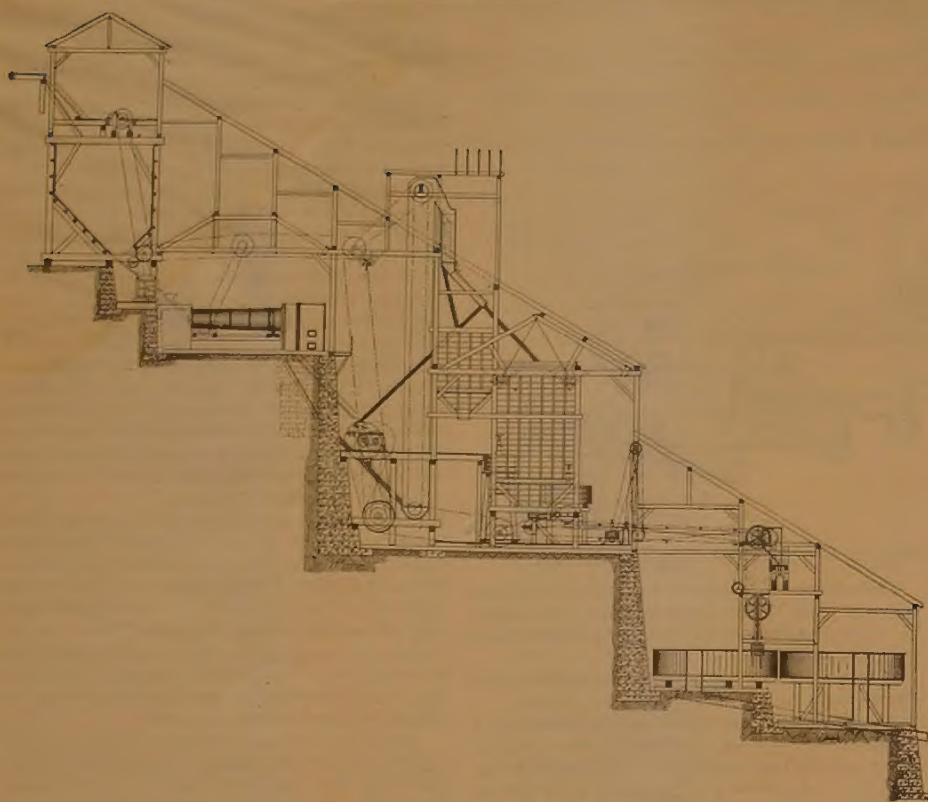
CONCENTRATION.

Concentration is a preliminary manipulation by which ores are prepared for subsequent metallurgical treatment. It may be divided into: *First*—Concentration Proper; *second*—Ore Dressing.

Concentration Proper.—This has for its object the reduction in bulk of the material to be treated by subsequent processes. The reduction in bulk consists in the elimination of the worthless gangue and the consequent concentration of the valuable mineralogical con-



100 Ton Concentrating Mill built for The Iowa Gold Mine & Milling Co., Silverton, Colo.



100 Ton Cyanide Mill, built for The Highland Boy Mining Co., Bingham, Utah.

ents of the ore. Thus a hundred tons of ore carrying ten per cent. of galena would yield ten tons of galena as the product of concentration. By this means the smelting of ninety tons of gangue is obviated. In practice, of course, there would be some loss of galena incident to the concentration, while some gangue would be contained in the concentrates.

Ore Dressing.—Ore Dressing has for its object, in addition to the concentration of the mineral constituents of an ore, the elimination of certain minerals that would be detrimental to the subsequent treatment of the "concentrates." For example, many argentiferous galena ores carrying zinc blende, which is usually poor in silver, and which not only causes an increased consumption of fuel, but gives also rise to excessive silver losses in the subsequent smelting process. By dressing is likewise effected the separation into distinct products of the several metallurgical ingredients of an ore. The desirability of treating ore by concentration and dressing for the extraction of metals by other processes is purely an economic question, depending upon the costs of concentration and dressing as compared with the saving thereby effected in its final treatment.

The Iowa Mill is designed for coarse concentration, with machinery for re-crushing the tailings from the jigs.

The ore after passing through the crusher, falls into the ore bins, and is drawn out as required into the automatic feeders which regulate the supply to the crushing rolls. From the rolls the ore goes to an elevator, which raises it to the head screen. The oversize returns to the rolls for crushing. What passes through the first screen is delivered into screen No. 2 and so on. The particles of ore remaining on the screens are discharged into the jigs below. The jigs separate the heavy mineral particles from the light waste particles

of rock. The screening is done wet with jets of water washing the screens to keep them clear.

The material too fine to be caught on the last of the revolving screens is run over hydraulic classifiers and delivered to the slime dressing machinery. The tailings from the jigs are re-crushed in Huntington Mills, and also go to the classifiers for treatment on the

tables. For some ores this is found necessary small particles of mineral being carried by pieces of rock several times the volume of the mineral in size, but so small and light that they have been carried past the previous saving devices.

CYANIDE PROCESS.

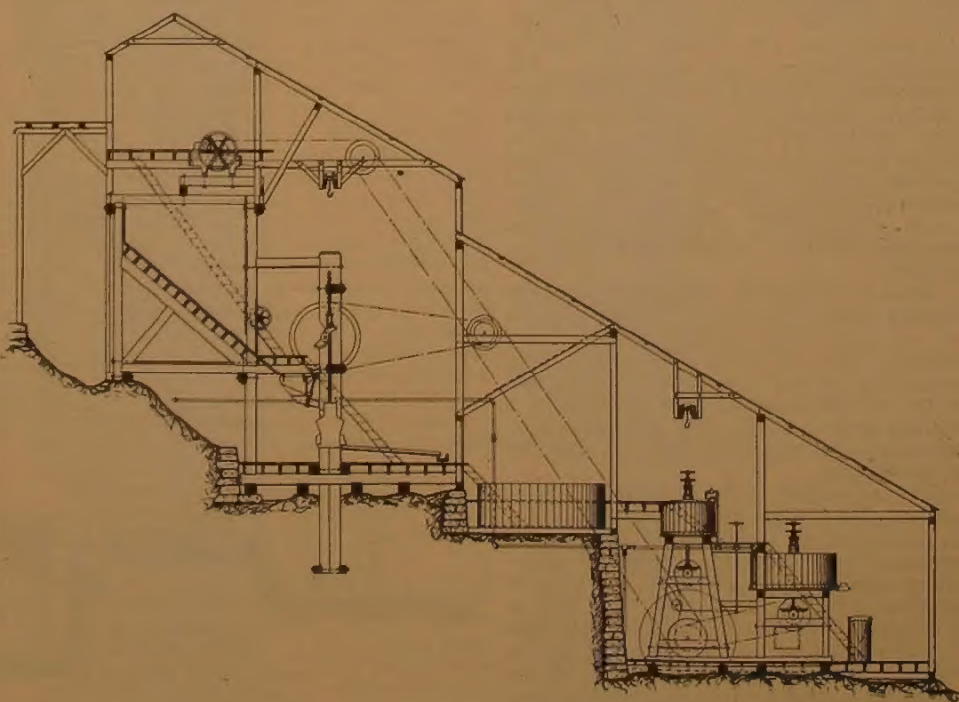
The ore comes to the mill in cars and is dumped over inclined grizzlies onto the rock breaker floor. The small pieces pass through the grizzly into the ore bins beneath. The coarse ore is passed through the crusher into the bins.

From the storage bins the ore is drawn by automatic feeders and discharged into two conical revolving dryers.

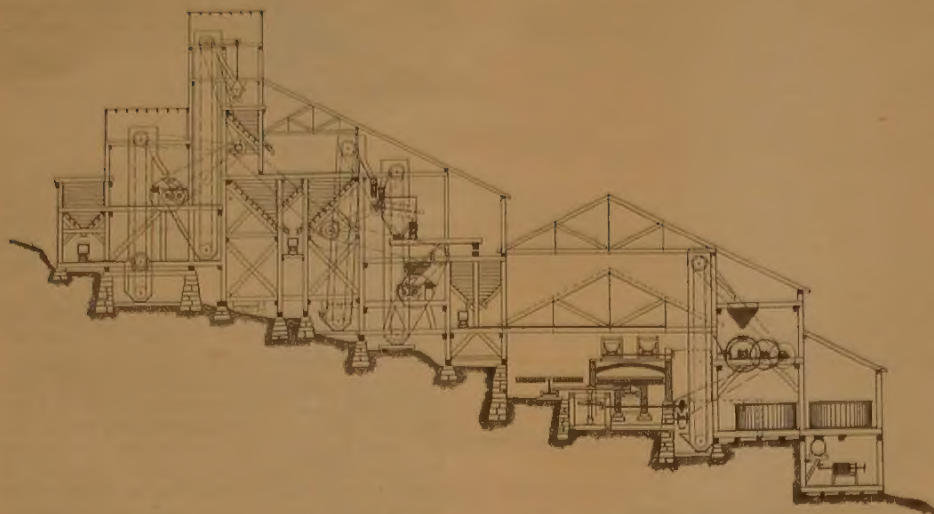
The thoroughly dried ore runs directly from the dryers to the feeders of three sets of fourteen by thirty inch Davis Crushing Rolls. As it passes through the rolls the ore is elevated to the sizing screens, the oversize returned to the rolls and the finished pulp to the pulp storage bins. In dry crushing to twenty mesh or finer, the ore should always be crushed at as high a temperature as possible, as it crushes and screens much easier.

In the majority of cyanide mills the ore requires roasting after being crushed to size the pulp is therefore put through some type of mechanical roasting furnace, then over a cooler before going to the pulp storage bins. In the Highland Boy Mill roasting is not necessary.

From the pulp storage bins the ore is taken by conveyors and automatically discharged into the leaching tanks, where the values are leached out by a weak solution of cyanide potassium. The cyanide solution is stored in tanks above and is piped to the leaching tanks as desired. When the precious metals are dissolved the solution is drawn off into the gold solution storage tanks, and slowly passed through the zinc precipitating boxes consisting of a series of light steel boxes filled with zinc shavings. The gold and silver in solution are deposited as a bluish slime. The sol-



Wet Crushing Silver Mill built for The Babicanora Mine, Sonora, Mexico.



100 Ton Chlorination Mill, built for The Colorado Ore Reduction Co., Cripple Creek, Colo.

ution is then pumped back to the solution storage tanks and cyanide added to bring it to standard strength.

The slimes from the precipitation boxes are first separated from the zinc and then melted down into bullion.

In this mill the ore after going through the rolls, is separated into two sizes, the finer being treated in amalgamating pans. This is not a common method.

After the leaching the ore is washed out of the tanks and passed over concentrators where the remaining values, such as coarse gold, sulphides, etc., are saved.

SILVER MILLING.

Silver milling ores are divided into two classes; First—the "free" milling ores which are amalgamated directly. Second—The "base", which requires a preliminary or chloridizing roasting.

The cut herewith shows the customary arrangement of a wet crushing silver mill. The ore is brought in by cars at the top of the mill, is dumped over the inclined grizzly or screen and rolls onto the crusher-floor. All the small pieces pass through the screen or grizzly into the ore bins underneath. The coarse rock is shoveled into the crusher from the floor, which is on a level with its receiving jaws, and is crushed into the size of walnuts, falling into the ore bins, from whence it passes into the automatic feeders through inclined chutes controlled by ore gates. The automatic feeders being kept full, supply the crushing machinery uniformly and as fast as required.

From the stamps the pulp flows into large settling tanks where excess of water is drawn off, or, if the "Boss System" is used, flows directly into the pans. The thick pulp remaining is shoveled in regular charges into a row of amalgamating pans, in which it is worked several hours, first with salt, bluestone and other chemicals, then with additions of quicksilver.

The contents of the pans are run into large settlers placed below and in front of the pans, in which the pulp is thinned by additions of water and gentle agitation, and all the quicksilver with precious metals in the form of amalgam settled to the bottom. The pulp is gradually run off from the settlers and flows to waste. The amalgam is strained from the excess of quicksilver retorted to drive off the remaining quicksilver, and the resulting mass of silver and gold melted into bars.

Sometimes values carried in base ores which will not yield to the above process are caught by concentrators which receive the waste pulp from the settlers.

A clean-up pan is generally furnished with a ten stamp mill and larger mills.

All of the silver mills are now provided with a quicksilver system of elevating and distributing quicksilver throughout the Mill systematically, and this is accomplished by a special elevator.

CHLORINATION MILL.

In the 100-ton chlorination mill of The Colorado Ore Reduction Co., Arequa, Colo., the ore is first passed through their private sampling mill where it is crushed to $\frac{1}{4}$ -inch, sampled and bedded in storage bins.

From these bins the ore is drawn into cars and trammed to the automatic feeders of the revolving dryers. After passing through the dryers the ore falls into the boot of an elevator and is elevated to the sizing screens. The over-size from the screens falls into the feeder hoppers of the fine crushing rolls is fed through the rolls and again elevated to the screens. The ore passing through the screens is conveyed to the finished pulp bins.

From these bins the pulp is drawn into the automatic feeders of a Ropp Roasting Furnace. The ore after being roasted falls into a water jacketed conveyor where it is cooled and conveyed to an elevator which raises it to the storage bins, whence it is drawn into the charging hoppers directly over the barrels.

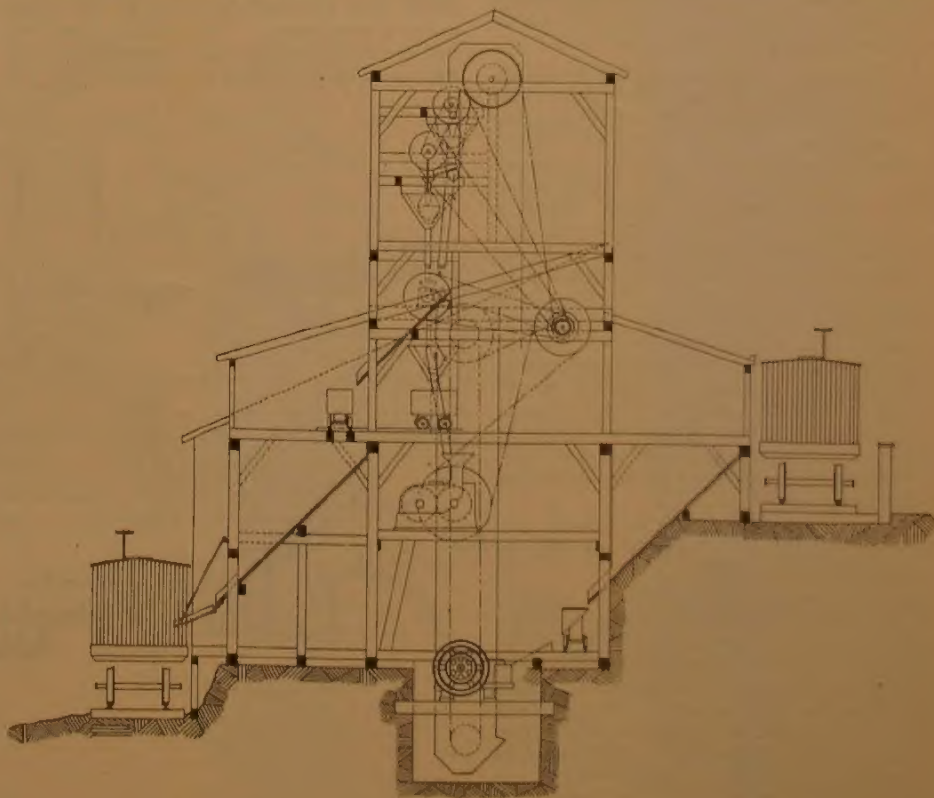
The Chlorination barrels are cylindrical sheet steel vessels, arranged to be revolved on trunnions. They are lined with sheet lead and provided with an internal filtering diaphragm to separate the gold chloride solution from the pulp after leaching.

The roasted ore is charged into the barrel with sufficient water to make a liquid pulp and the required amount of lime and sulphuric acid added. The barrel is then closed tightly and slowly revolved, thoroughly mixing the whole mass. In from three to six hours the barrel is stopped and the gold chloride solution is drawn off through the filter into lead lined tanks; the filtering being assisted by air or water pressure.

Sulphur dioxide and then hydrogen sulphide gas is passed through the solution, precipitating the gold. The liquor is passed through a filter press, and the gold slimes are finally collected in what is called a sulphide cake, which is dried, roasted and the residue, mixed with suitable fluxes, is melted down into almost pure gold.

ORE SAMPLING.

The Sampling Mill of The Midland Ore



100 Ton Sampling Mill built for The Midland Sampling and Ore Co., Cripple Creek, Colo.

Sampling Co., has a capacity of ten tons per hour and illustrates very well the modern sampling mill.

When the machine samplers are used the mill is practically automatic in action. The ore is not handled from the time it is trammed to the crusher until it is drawn from the receiving bin to be taken to the storage bins. Even these operations can be performed automatically if desired.

The ore to be sampled is received in the storage bins at the upper side of the mill. From thence it is drawn into cars and trammed to a 9x15 inch Blake Crusher. It is then elevated to the feeder of a 16x36 inch Davis Roll. This roll is elevated above the floor so that the crushed ore can be spouted directly to an elevator to be raised to the automatic samplers or onto the floor for hand sampling.

In hand sampling the ore is first cut down by throwing one shovelful into a wheelbarrow for each three or four thrown into the elevator boot.

The sample is cut down in the usual way on an iron sample floor.

The ore shoveled into the elevator is discharged directly into a small storage bin from which it is drawn directly into cars for shipment or transportation or taken to the main storage bins.

When the automatic samplers are used the ore goes directly to the elevator and is discharged into the spout leading to the samplers.

The samplers are of the Vezin type, which cut a rhomboidal section out of a falling stream of ore. A sample is taken about each two seconds and varies from ten to twenty per cent. of the total amount of ore.

The Cripple Creek ores require comparatively fine preliminary crushing for correct sampling either by hand or automatically, so that but one sampler is used cutting out ten per cent., the further sampling being made by hand.

In other districts, where coarse crushing is possible, two or more samplers are used; a sample of about twenty per cent. being taken by the first sampler. This is re-crushed and delivered to the second sampler which takes out a twenty per cent. sample. A further reduction and sampling is sometimes made.

The sample from the automatic machines, or sample floor, is taken to the sample room where it is put through the sample rolls, quartered down, then put through a sample grinder, screened and finally reduced to the desired fineness and quantity.

Five Shipments.

The Weber Gas & Gasoline Engine Co., of 434 Southwest Boulevard, Kansas City, Mo., report the following sales of Gasoline Hoisting Engines last week:

One 10 H. P. Single Drum Geared Weber Gasoline Hoisting Engine, to the Cornucopia Mines, of Oregon;

One 25 H. P. Double Drum Geared Weber Gasoline Hoisting Engine, to be used underground, hoisting from slope to the La Aurifera Mine, Monterey, Mexico.

One 10 H. P. Single Drum Geared Weber Gasoline Hoisting Engine to the Copper Queen Mining Co., Globe, Ariz.

One 10 P. P. Single Drum Geared Weber Gasoline Hoisting Engine to Boise City, Idaho.

One 10 H. P. Single Drum Geared Weber Gasoline Hoisting Engine to Denver.

Making five shipments of Weber Hoisters to mining concerns in one week.

GOLD MINING IN THE BLACK HILLS.

BY PROF. H. O. HOPMAN,
Of the Dakota School of Mines, Rapid City, Dakota.

[Continued from our issue of Feb. 1st, 15th, Mar. 1st 15th, and May 1st.]

Subjects treated upon in preceding issues are as follows:

I. THE ORES.

Character of the Ores.
Sorting of the Ore.

II. ENUMERATION OF MILLS.

III. OUTLINE OF PLANT AND PROCESS.

IV. GENERAL FEATURES OF THE MILLS.

Distribution of Power.
Supply of Water and Fuel.
Auxiliary Arrangements.

V. THE MILLS IN DETAIL.

Grizzlies.
Rock Breakers.
Ore Bins.
Feeders.
Battery Foundations, Frames and Guides.
Battery Frames.
Guides.
Mortars.
Dies.
Screens.
Stamps.
Cams and Cam-Shafts.
Crushing Capacity.
Apron Plates.
Mercury-Traps.
Sluice Boxes.

VI. LABOR IN THE MILLS.

Daily Collecting of Amalgam and Dressing of Plates.
The Clean-up.

When the clean-up of the mill is over and the stamps are once more in operation, the sands that were shovelled out from the bottom of the mortar have to be worked up and the amalgam has to be cleaned, so as to be ready for the retort. Two crusher-men are detailed to clean up the sands. These contain bits of iron that have come from the tools used in the mine or the crushing machinery of the mill, and also pieces of amalgam. The sands are first treated in a rocker. Any coarse pieces of iron are picked up and collected in a separate heap. When the sands have been rocked for a little while and the hose has been placed on them, the residue on the hopper is broken as fine as possible with a wooden mallet. The products obtained by rocking are the coarse particles remaining finally in the hopper. These are washed in a coarse screen over the clean-up pan, and any amalgam remaining on the screen is picked out and thrown into the pan. The sands go back to the battery. The heavy sands that collect on the curtain and riffle are taken up in a bucket to be worked in the pan. Those settling in the sluice which conducts the slimes to the waste flume are shoveled out and returned to the battery.

There remains the purifying of the amalgam collected from the chuck-blocks, apron-plates, sluices leading from the mercury traps, mortars, old shoes, dies and screens. It is charged with water into the clean-up pan (5 ft. in diameter, the muller making 30 revolutions per minute) and 600 to 700 lbs. of quicksilver are added. It takes about three hours to clean in the pan all the by-products that contain any amalgam. When this is all collected and the water above it somewhat

clear, the muller is raised with block and tackle and the entire contents of the pan are emptied through the lowest discharge opening into a square box which overflows into the tailings discharge box. The muller and bottom of pan are cleaned with brush and water. The liquid amalgam in the first box is now freed from water and passed through a strainer. The resulting pasty amalgam is removed, and freed from the excess of quicksilver by wringing it in canvas bags in water. The balls of hard amalgam remaining in the bags contain about 38 per cent of gold. The quicksilver collected beneath the strainer goes back to the main stock; that obtained by squeezing the pasty amalgam is first purified by adding some nitric acid, stirring it, and then washing it with water.

The clean-up on the 15th of the month is much simpler than that on the 1st, as only the chuck-blocks are taken out and the mortar is left intact, except, of course, when any break has occurred in shoe or die. On the 15th, however, the mercury traps are cleaned. Their contents go simply into the pan and are worked with the rest of the products containing amalgam. This clean-up lasts five hours—that is, two hours less than the one on the first of the month.

The cleaning-up of old iron and wood chips, which is done once a year, still remains to be mentioned in this connection. The pieces of iron that are picked out of the sands in the bottom of the mortar are first scraped, to remove any amalgam adhering to them. They are then thrown out upon an enclosed heap in the yard and left there to be corroded by atmospheric action. The rusting is hastened by adding some salt to the heap at various times. Once a year, the iron that has entirely fallen to pieces is charged with quicksilver into the pan and its gold extracted. The chips of wood, which float on the top of the water in the battery and often clog the screens, are repeatedly removed and collected in a box in one of the window recesses. They are then emptied on a heap in the yard, and once a year are set on fire. The ashes are collected and amalgamated in the pan. In this way are saved every year from 16 to 18 pounds of amalgam from the two mills of the Homestake Company.

Retorting and Melting.—The quicksilver still retained by the hard amalgam is removed by retorting. Both bulb retorts and cylindrical ones are used. They are all of cast-iron. The cylindrical retort of the Homestake Company is 12-in. diameter and 3-ft. long, and holds about 1000 lbs. of amalgam. The usual charge of 500 lbs. is retorted in about 6 hours with $\frac{1}{4}$ cord of wood. The loss of quicksilver is nominal. The retort metal amounts to 38 and 40 per cent of the original charge. At the Caledonia mill it is only 33 per cent, less care being taken in cleaning the amalgam; and at the Deadwood-Terra mills it is often only 25 per cent, by reason of the fine condition of the gold, which requires more quicksilver to form amalgam.

The retort-metal is now melted into bars. At the Homestake mill, two kinds of moulds are used, the 1500 ounce silver mould, 5 by 5 by $11\frac{1}{2}$ inches, and the 700-ounce mould, $3\frac{1}{2}$ by 4 by $9\frac{1}{2}$ inches. The bars are cast from 3 to 4 inches thick and weigh from 1000 to 1400 ounces. It takes about four hours to melt four 1400-ounce bars, and the crucible lasts for from eight to twelve charges.

The loss in melting with Homestake retorted bullion is only 1.5 per cent, and the average composition of the bars is 820 gold.

165 silver, 15 base metal. The loss of the Caledonia bullion is greater (7 per cent), as less care is taken in cleaning the amalgam. The average composition of its bullion is 798 gold, 182 silver and 20 base metal.

The bullion is sampled, weighed, assayed and shipped.

VII. WORKING RESULTS.

The Homestake and Golden Star mills together produced, according to the report of the Homestake Company from June, 1887, to June, 1888, \$895,822.37 worth of gold from 243,355 tons of ore, which corresponds a yield in free gold of \$3.68 per ton. It is claimed that 85 per cent of the free gold is saved. According to this, the ore would run in free gold \$4.33 per ton. The total value of the ore varies from \$5 to \$10 per ton; the amount of concentrates does not exceed 3 per cent. Their value, as shown by experiments in the pan, is \$24 per ton, although, judging from the average assay of the tailings (\$1.50 per ton), a much higher figure would be expected.

Two sets of experiments were made in the spring of 1885, by Dr. R. Goering, on the Homestake and Golden Star tailings, the first when the mills had no mercury traps, the second after these were introduced. Up to that time there had been collected, by means of blankets, in a separate building (the blanket house), 1124 tons of concentrates, which assayed \$35.10 per ton. These, panned down, gave 20.5 per cent cleaner concentrates, assaying \$40.18 per ton. This shows that the gold recovered must have been either inclosed in quartz or rusty, or that amalgam had been carried off with the tailings and was recovered by the blankets. When in consequence of these tests the mercury traps were introduced, the loss was reduced. The concentrates then saved assayed \$27.63 per ton. They gave up 92 per cent of their gold in the pan, but the pure pyrites still assayed \$12.26 per ton, showing that, while the loss had been diminished, it had not been stopped. The concentration of tailings by blankets, being too expensive, was given up.

From the other mills, under the Homestake management no official reports are made public; therefore no data can be given. It may, however, be stated that the tailings from Highland ore average \$1 per ton, those from Deadwood-Terra ore \$0.50 per ton, and seldom exceed \$0.75. It would be interesting to find how small the amount of concentrates is and how high these would run.

One point still remains to be considered in regard to working results, that is the fineness to which it is necessary to crush the ore. Dr. R. Goering made tests to find a relation between size and assay value of tailings. Samples were taken hourly for a length of time and the sands obtained dried, weighed and screened through different sieves. The figures are give below:

TABLE VI.—Relation between Size and Assay-Value.

Per cent in weight.	Passing through screens, No.	Remaining on screens No.	Assay value per ton.
94.07	50	\$1.25
2.53	50	40	2.13
3.40	40	2.76

They show that the loss in the tailings increases rapidly if the screens are allowed to remain too long in the mortar. This is still better shown by another series of experiments (December, 1888), on tailings, running

\$2 per ton, that were screened through a No. 30 mesh sieve. Of these 6 per cent, that did not pass through the screen, assayed as high as \$5.02 per ton. The result is, as has been said before, that the heavy Russia-iron slot screens have to be exchanged every fortnight.

The Caledonia Mill crushed from May, 1887, to May, 1888, 73,425 tons of rock and produced \$295,816.25 worth of bullion, equaling a yield of \$4.02 per ton in free gold. Figures corresponding to those given in the Homestake Company could not be obtained. It may, however, be stated that the blanket concentrates of the Caledonia, amalgamated raw in the pan, yield a product of pure pyrites, assaying \$90 to the ton, and that the tailings from the blankets, when panned, yield concentrates worth from \$7 to \$9 to the ton.

TO BE CONTINUED.

CORRESPONDENCE

ARIZONA.

KINGMAN, ARIZ., April 29, '98.

EDITOR JOURNAL:—Mohave County will one of these days eclipse all other sections of Arizona. The mines of this section are all showing up in fine shape. The work being done by the Temple Bar Consolidated Mining Co. is simply immense. They are working about 60 men, prospecting the largest hydraulic gold mining operations in the southwest. The Temple Bar Co. expect to make their first clean-up in the near future, and if it proves all that it is expected, there will be others commence operations, the Grand Canyon, Santa Ana and other companies organizing and already organized, will be in the field. The telephone between Temple Bar and this place is nearly completed, and the road from White Hill to Temple Bar has been finished.

The "Mignonne," a new boat for the Temple Bar Company, was sent out to the river this morning.

The McElroy mine is working full time, turning out ore to supply the mill. Judge W. C. Blakely and Charles Lynch are the owners of this property.

The 5-stamp mill at Todd Basin, recently purchased by Charles Gracey, is being moved to the river to work the ores from his Klondyke mine.

Brown Bros., Harlet & Scott have opened up a splendid body of silver-gold ore in the Lone Star mine, Mineral Park. The ore was found in the hanging wall, only a few feet from the old workings.

A big body of ruby silver ore has been struck in the Merrimac mine, at Chloride.

Bob Kerr made a new strike about eight miles south of W. E. Frost's place, near Walapai Springs, last week. Samples of the ores, taken from the surface of the discovery, gave returns of 40 per cent of lead, \$10 gold and 65 ounces of silver.

A prospector, named Riley, has made the discovery of a rich gold-bearing ledge, on the east side of the mountain from the Buckeye. James Uncapher is one of the owners in the new field.

SUBSCRIBER.

CALIFORNIA.

RANDBURG, CAL., May 4th, 1898.

EDITOR JOURNAL:—Complying with my promise while in Los Angeles I take this opportunity to drop you a line and give you what news there is obtainable.

The Little Butte has erected a building for their new windmill, and expect to have their plant in operation within the next few weeks.

John Singleton has sold a part interest in his Security mine in this district to D. M. Kelley for \$500. Development work will now be prosecuted with vigor.

W. P. Young and P. W. Loyd, both of Pasadena, came through Randburg the latter part of April on their way to the Argus and State Range country, where they will spend some time prospecting for the precious metals.

Randsburg had another close call by fire recently. On April 29 a fire broke out in the rear of a restaurant and was gaining great headway when discovered.

The Eureka mill made a run of ore from the Black Hawk mine last week which showed up pretty well.

The Kinyon mine, located on Gold Hill, is being steadily worked by the Kinyon's, and produces its quota of first class ore.

Ore from the Yellow Aster is being milled which will raise the average of the ore produced by this mine.

Richard Callahan has secured a half interest in the Lucky Boy mine, Rand mining district, from James Grant for \$250. The Lucky Boy is a splendid piece of property and will no doubt develop into a dividend-payer in the near future.

The Miner of this place reported that a ledge of ore had been discovered on a claim out near the Blackhawk mine that assayed \$11,000 per ton, but the Miner does not seem certain of the existence of the ledge, as it was not able to verify the rumor before going to press. I have been unable to ascertain the source of the rumor or find the claim designated, but if anything authentic develops will let you know. "ONE OF THEM."

NEW MEXICO.

BLAND, NEW MEXICO, April 30, '98.

EDITOR JOURNAL:—Considerable more development of Cochiti mining property will be in order next month than there has been this, which is usual in May, with the spring well advanced.

Steadily heavily loaded wagons continue hauling ore from the Lone Star mine to the Bland mill.

Our paper here, *The Bland Herald*, says:

"It has been falsely asserted that the refractory elements of the ores of the Cochiti mining district consist of lead, antimony, zinc and copper. This is erroneous, as proved by innumerable tests by chemists and assayers of Bland and elsewhere. The fact is that the base metals mentioned are not contained in any of the Cochiti ores, excepting in one or two instances where an almost imperceptible percentage of zinc and copper pyrites occurs. The base ores of this district are those which contain sulphur and tellurium in comparatively small proportion, these elements being easily precipitated by simple methods of first roasting the pulp. It has also been demonstrated that cyanide, without roasting, is a successful agent in the treatment of the ores of this district. The characteristics of the ores of the Cochiti mining district consist chiefly of sulphurets, sulphides and sylvanite.

The extensive development work at the Albemarle mine continues unabated. The steel frame of the mill and machinery is being rapidly constructed.

The Washington group of mines are mak-

ing a good showing and Robt. Douthill, the affable superintendent, is paying off the indebtedness of the property.

A vein of good-looking quartz, from 25 to 100 feet wide, showing indications of possessing great values, has recently been located in the Julia No. 2, by Herman Clausen, in Colla Canyon, and it reported to be one of the biggest properties in the Cochiti Mining District.

Telegraphic connection between Bland and Albuquerque were made last week and we now have a splendid service. The Western Union wire between Thornton and Albuquerque was tapped, and all the war news is received daily by our people.

OBSERVER.

Miscellaneous Mining News.

ALASKA.

Reports from the scene of the recent avalanche at Sheep Camp, in the Chilkoot Pass, are that desperadoes have robbed the bodies of the victims of the disaster of sums estimated at thousands of dollars. Committees of citizens are searching for the robbers, and if found they will be hanged.

There is trouble also over the question whether travel shall be resumed over the trail before all the bodies buried under the snow have been recovered. Friends of the missing were declaring that their bodies would have to be added to those of the victims before travel was resumed, and an encounter between them and the men who want to push on to the Klondike seemed imminent. The work of rescue was simply a farce. The work was carried on without system and only 500 men volunteered to aid. Some of the bodies were still warm when found, but were hurried off to the morgue instead of an effort being made to resuscitate them. Some of the men rescued were buried under the snow for five hours.

ARIZONA.

An old mining property along the Colorado river in Arizona will shortly be developed, a company having recently been organized in Los Angeles for that purpose. The mine is about seventy miles below the Needles, at Gier's landing. The mineral was discovered about thirty years ago by Dr. W. H. Gier. He returned about nine years ago, and has been there ever since. A nephew, W. H. Gier, has succeeded in organizing a company of Los Angeles people to develop the claims. A stamp mill will be shipped to Needles, where a flatboat will be built of lumber suitable to use in erecting a mill, and the plant will be floated down the river to the mines. A team loaded with supplies will make the trip overland.

John W. Gerritt of Kingman has purchased the old Metallic Accident mine in Mohave county, which has produced about as much rich silver ore as any property in that section of the territory. Mr. Gerritt will at once put the mine in the list of producers.

CALIFORNIA.

AMADOR COUNTY.

At Sutter Creek, the Oneida crosscut at the 1500 foot level encountered the ledge at a

distance of 255 feet from the shaft. The ledge is about two and one-half feet thick, and some parts of it are very good, showing free gold and an abundance of sulphurets.

The Lucile hoist, engines, boilers, gallows frame, etc., recently bought by the Lincoln Company of Sutter Creek, are all on the ground of the latter company, and a gang of men is busy removing the old machinery and getting ready to put up the new.—*Amador Ledger*.

The directors of the Wildman Company have decided to push the new Emerson shaft, at Sutter Creek, down as rapidly as possible, and to erect an additional forty stamps on the Mahoney property, and put in a new compressor.

BUTTE COUNTY.

D. M. De Long and H. J. Raisch, of San Francisco, are about to inaugurate operations on a large scale on North Fork. Having secured eight miles of the river bed, their purpose is to place a steam derrick to handle the boulders, though mining operations are not expected to be under full headway until next season.

CALAVERAS COUNTY.

Lorenzo Pendola, who has a ranch about one half mile above Robinson's Ferry, has recently discovered some very good quartz prospects on his property. He sank a couple of shafts fifty feet deep at different places on the lead, and found a vein that will average fourteen feet in width, and the rock shows a very good prospect in free gold and sulphurets. In early days the placers in the vicinity of this ledge were among the richest diggings in that part of the county.

Mr. Pendola owns about a mile of land at the point where the lead passes through.

EL DORADO COUNTY.

G. W. Kimble has begun work on the Green Mountain mine and has let a contract for sinking a shaft.

The Two Channel gravel mine, near Georgetown, is employing fifteen men. Shortage of water in that section is anticipated.

A 40-stamp mill is talked of for the Griffith Con. mine at Diamond Springs.

KERN COUNTY.

Mr. Burcham says there is no longer any doubt about the permanence of Randsburg as a mining camp, as the properties are all showing better every day. Nearly 100 people from San Bernardino are out in that section and they all seem to be doing well.

The mills at Garlock are all running steadily—three of them on the Rand company's ore. The Harrison & Willard mill at Cuddeback lake and the 10-stamp mill at Johannesburg are both running steadily with satisfactory results.

The Talc, an eastern extension of the Talc, and the Talc No. 2 mines and mill was recently purchased by A. S. C. Forbes and associates, from James H. White and others \$16,000. The Talc mines are located about eight miles south of White River, Tulare county, and are extensively developed. The walls are granite and the dip of the vein is vertical. The rock is treated in a 3/4 foot Huntington mill.

Randsburg Notes.

Messrs. J. J. Donovan, Angus Matheson and Chas. Adams have just milled twelve tons of ore from the Merton and Buckboard claims over south of the Marvel. The ore was milled at Cuddeback Lake and cleaned up \$12 per ton. They have a seven-foot ledge.

Mr. J. J. Donovan gave a bond on a quarter interest in the Golden Sheaf to Messrs. McKenzie and Long for \$500. Mr. Donovan says he thought he was driving a fine bargain, as the ore was low grade and the vein thin. But things have been reversed and he now knows the other fellows got the bargain, for they can take out \$500 in three days any time.

A large nugget weighing between fifteen and sixteen ounces, was found in a canyon near Kane Springs a few days ago by a man who was dry-washing there. It is not necessary to go to Klondike to find big nuggets.

The Merced mine has just had a run of forty-one tons of second-grade ore reduced at the Eureka mill which cleaned up \$1250; we call this pretty good for second grade ore. How does this strike the low grade camps?—*Randsburg Miner*.

NEVADA COUNTY.

Vincent & Eddy are unwatering the Good Hope mine, near Grass Valley, preparatory to inspection for purchase. The ledge in this property is from 14 to 16 inches wide and the ore will average \$50 per ton.

The Old Home Con. Co. at Blue Tent have begun sinking and have placed a hoist in the tunnel 700 feet from the mouth.

RIVERSIDE COUNTY.

Active work is being pushed on the Iron Chief mine in the Eagle Mountain district, which was recently sold for \$150,000. The owners have four eight-horse teams, besides two of their own at work hauling lumber and pipe from Walters Station on the Southern Pacific, for the purpose of building a cyanide plant and running the pipe line thirteen miles for the water. The owners claim they have \$500,000 ore in sight. They are down between 300 and 400 feet and have crosscut the vein for thirty-five feet without finding the walls, all in clear, solid ore that runs from \$25 upwards.

Walter Lee and W. H. Hinkley of San Bernardino and W. E. Cummings of Los Angeles are said to have a good thing in their Desert King mine in the Eagle Mountain country. They run a 175-foot tunnel and an 85-foot shaft, all in ore.

SAN BERNARDINO COUNTY.

The Randsburg-Santa Fe Reduction Company is constructing one of the largest mining plants in the state at that point. The plant consists of a 50 stamp mill, reduction and sampling works. A cyanide plant and smelter will be added as soon as the successful operation of the works already erected has been demonstrated.

This plant will be in operation on the custom plan, or the ore will be bought from the miners and worked up by the company, as the miners in the territory adjacent may deem best. When bought the price paid for the ore will be upon the basis indicated by the sampling process, through which all ores have to pass before taken off the hands of the miner.

The works have been erected with the special object of working low grade ores. If they

do this successfully their value will be incalculable, both to the owners and miners of that section.

The work on the above mentioned plant is being done by the Colorado Iron Works Co., of Denver, under the personal charge of Superintendent McCabe. From 35 to 50 men are employed. There appears to be ample capital back of the scheme and the eastern end of the county, at least, hopes for its success.

SAN DIEGO COUNTY.

It is reported that capitalists are negotiating for the purchase of the old Cargo Muchacho mine, not far from the Golden Cross properties in eastern San Diego county. The Cargo Muchacho had a great record as a producer in the early days when the mine was worked to a depth of 600 feet, but the property has been idle for a long time. Under proper management and the application of up-to-date mining methods, it would probably soon become as profitable an enterprise as its neighbor, the Golden Cross.—*San Bernardino Transcript*.

In our issue of May 1st, we notice a typographical error. The Senator mine, 18 miles north of Yuma, has a 20-stamp mill and not a 2-stamp mill as reported by us. Water is piped from large wells at the Colorado river to a large reservoir on a hill above the Senator mill and thence piped by gravity all over the camp. A cyanide plant to handle the tailings is being put up. The pay roll is about \$5,000 per month.

SIERRA COUNTY.

The Happy Hollow mine, near Portwine, has started work.

Near Slate Creek House, Wilson Bros. and Willow have begun prospecting on the old Mexican ledge.

The Los Angeles Co. that bonded the Kenton mine, near Allegheny, are driving a tunnel and building a road to haul in machinery. This mine has not been worked for over twelve years. T. R. Garnier is the superintendent.

TUOLUMNE COUNTY.

From all parts of Tuolumne County come roseate reports concerning mining development. South of the Tuolumne River, in the vicinity of Groveland and Big Oak Flat, there is great activity, and various old mines which have been idle for years are again being worked. On the Eastern Lode, Soulsbyville, Summersville, Cherokee and other camps report activity on all sides, old mines being worked with full force and much prospecting going on. Tuttle town is "strictly in it" when mining prosperity is referred to. The Maryatt Company employs thirty men, and this force will be gradually increased, while the Bell, Bown and Norgerian Companies are all prosecuting work vigorously. In fact, the hills are full of men developing prospects, many of which a year hence will be producing mines.

COLORADO.

The San Juan Gold Mining Company, of Telluride, Colorado, placed an order with the Colorado Iron Works Company, for a 100 ton dry crushing plant. Their patent high speed narrow face rolls will be used to do the fine crushing. The sizes of these rolls are 54"x8", 42"x6", and 30"x6". Bruckner cylinders, roasters, screens, ore breakers, elevators, etc., constitute the balance of the machinery for this plant.

A new strike of considerable importance was encountered this week while sinking the shaft of the Christmas mine on Bull Hill, Cripple Creek. In sinking at a depth of 300 feet a vein of ore three feet wide was cut which gives assay values of from \$60 to \$80 per ton.

The output of sulphide ore from the deep shaft of the Small Hopes Mining Company on the Marian, at Leadville, Lake county, continues heavy. The payroll has been increased largely since April 1st.

Wilcox, Whitehead and McDonald are working the Globe, in Spanish Creek, which shows up an eleven-foot vein yielding good assays. They are actively pushing a tunnel.

Frank Earle tapped the Forest King ore in his tunnel on Spring gulch, near Spaniah creek, Saguache county. He will make arrangements to develop his property.

GEORGIA.

At the Glen Comyn gold mine Mr. C. C. Jones has 20 stamps going day and night, and has 15 more to start up as soon as another ditch is completed, so that he can get water to the mill. The first clean up of the plates was satisfactory. The boxes have not been touched and they will give up well when they are cleaned. Mr. Jones is working a giant on a saprolite belt 50 ft. wide and he has another belt more than 100 ft. in width. Quartz stringers cut through both belts and the ore carries good values.

MICHIGAN.

Work continues at pit 1 of the Baltic, which is now down 140 ft. At pit 3, which is to be shaft No. 2, machinery is in place, and arrangements made for sinking a two compartment shaft. At pit 4 the lode is about 20 ft. wide and very rich.

The Winona property, which comprises 1,480 acres of land, situated 18 miles south of Houghton, near the Ontonagon boundary line, has been bought by Boston parties. A copper bearing lode 12 to 20 ft. wide, has been shown up for 1,650 ft.

It is said that the various companies that have been leasing coal lands in Saginaw county have formed a combination with the producers in Ohio and Pennsylvania to prevent local competition. Thousands of acres are now held by leases running from 10 to 15 years, and there is little intention, apparently, to develop the lands.

MINNESOTA.

The lease of the Mahoning property made by Wright, Davis & Co., and the estates of C. W. Wells and F. C. Stone, recently filed; provide for a royalty on a sliding scale, as follows: 27½ cents on a minimum output of 150,000 tons, and also 17½ cents for more than 700,000 tons, 15 cents for more than 1,000,000 tons, and 12½ cents for more than 1,500,000 tons.

MISSOURI.

A fire in the coal mine at Okaville, Washington county, that started over two weeks ago is now beyond control and the proprietors have decided to abandon the mine altogether. The loss is estimated at \$25,000.

The past week was extremely favorable for mining operations and the shipment from Joplin was the largest of the year, but owing it is claimed, to the demoralized condition of the metal market, caused by the prospect of war, the prices of both lead and zinc ore fell.

NEVADA.

Prospecting at the old Comet district continues, and Smith & Peaslee have found a 4-ft. vein that assays from \$3 to \$11 per ton in gold.

The Freudenthal Bros., working in the old Comet mine, have discovered ore two feet wide carrying gold values from \$3 to \$98 per ton. This claim was worked years ago for silver only.

The Dexter mine at Tuscarora shipped \$3300 in gold. An increased supply of water has enabled the management to increase the tonnage. At the stamp mill forty-five tons are going through daily and at the cyanide mill thirty tons. Two shipments of cyanides were made this month.

Sinking was resumed in the Young America east shaft and three eight-hour shifts are employed. The company has been pumping steadily for three weeks.

At the Ben Hur mine, near Ely, the tunnel has reached 100 feet and a good body of quartz has been found.

The ore bodies in the Star and Grey Eagle mines on the fifth and sixth levels average ten feet in width.—*Pioche Record*.

NEW MEXICO.

Output of Hillsboro gold mines for the week ending Thursday, April 21st, 1898, as reported for *The Advocate*:

	Tons
Wicks.....	10
K K.....	10
Richmond..	10
Happy Jack.....	5
Snake Group.....	50
Opportunity.....	10
Sherman.....	5
Prosper.....	5
Eighty-five.....	—
Rex (silver-lead).....	5

Total 110

Total output since Jan. 1, 1898. - 2,920.

OREGON.

F. Murray's clean-up on his first four tons of ore at Placer yielded \$40.

J. W. Coffman brought in his first clean up on his new quartz mine on Applegate.

Steam Beer mine made a contract last week with Mackin and Furman for digging 5 miles of ditch.

Geo. B. Elliff, of Starveout, brought in 43 oz. of gold last week from his placer. It doesn't look from this result that the place was well named.—*Oregon Mining Journal*.

A letter from Gold Beach, Curry county, to W. T. Bailey of Del Norte, contains the information that R. D. Hume has purchased a copper mine on Rogue river, paying \$20,000 for it. The mine now under purchase is some 15 miles from the mouth of Rogue river and is known as the Huntly claims. The ore thereon is high grade, several tons having been sent east for smelting. The sale will stimulate the search for copper leads in that section.

SOUTH DAKOTA.

A new shaft has been started on the Cleopatra mine on Squaw creek. R. B. Hughes, general manager. The shaft is being sunk about 150 feet below the old workings, where a good body of ore has been opened. It is expected that quartzite will be reached in 150 feet.

The shaft which is being sunk by the Deadwood and Delaware company in the lower portion of Ruby Basin is down 320 feet in porphyry. Work has been temporarily suspended because of water. It is considered a good indication. This company has just purchased 54 claims in this district, and 18 others are being negotiated for.

UTAH.

The Centennial-Eureka properties are officially reported to be in very fine conditions. There has been some talk of early dividends, but payments are not anticipated for some time yet.

The Dexter Company will clear about \$10,000 in April.

Good reports continue to come from the Four Aces, where the new ore body is holding up well.

The Geyser-Marion's mill is now operating with its increased capacity, and doing very well indeed. At the mines the ore showing is highly gratifying. In some quarters a dividend for this month is expected, and one of at least 2 cents may be paid, but in view of the heavy expenses the company has been to, together with the interruption of milling operations, the chances are small.

The Mammoth mines are looking and doing very well, although little ore will be raised for a few days, on account of shortage of timber. Twenty of the mill stamps have been hung up and the gold ore usually treated by them is going to the smelters. The dividend seems certain.

WASHINGTON.

The recently-formed Toroda Two Friends Gold M. & M. Company will shortly commence operations upon the Two Friends on Toronto creek, Okanogan county. From what we can learn, the company, which has at its head some of the best known mining men of this city, has sufficient funds in hand to carry out the preliminary development work without going to the public for the sale of its treasury shares.

FOREIGN MINING NEWS

AUSTRALIA.

The Colorado Iron Works Co., of Denver, Colorado, received an order from the Tasmanian Smelting Co., Ltd., of Zeehan, Tasmania, for two 42"x120" silver-lead smelting furnaces, including the necessary equipment for the operation of these furnaces. This order also calls for two complete sets of extra water jackets.

BRITISH COLUMBIA.

Harry Whitney Treat, treasurer, has just arrived from New York, with four smelter men, to prepare the buildings and ground at Van Anda City for the smelting plant which will arrive there in a few days. Thomas Kiddie, late of the Orford Copper Company, is

superintendent. Mr. Kiddie is one of the foremost metallurgical chemists of America, and acknowledged by authorities and technical institutions to be perfectly acquainted with the treatment of ores and metals.

A complete sampling plant and assay office will be attached to the smelting works at Van Anda City, Texada Island, where custom ores will be brought and smelted with the Van Anda ores. The present furnace has a smelting capacity of 60 tons per day, and additional furnaces will be added as needed. The ores will be roasted in piles to burn off the sulphur and oxidize the iron then charged into the furnace with coke, producing a 50 to 60 per cent. matte and the first waste slag will be used to construct a permanent dock in Van Anda bay. Further treatment of the matte to produce metallic copper will be carried on in reverberatory furnaces to be constructed in the near future. Edward Blewitt will continue as manager, and, like the other owners, has every confidence in the property. The vein at bottom of the new compartment shaft is still widening and increasing in gold value, while maintaining its remarkably high percentage of copper.

From B. C. Mining Critic.

A Coal Shipping Record.

The New Vancouver Coal Company of Nanaimo succeeded last week in loading no less than 6,000 tons of coal aboard the whaleback collier steamship Titania, within the space of twenty-one hours, and it is said that when the company adds new bunkers and other appliances to its coaling gear, even the limited time thus occupied in loading a big shipment will be greatly reduced.

Another Le Roi Dividend.

The Le Roi Mining and Smelting Company has declared another dividend of \$50,000. Meanwhile the mine continues at the lower depths now reached to yield a steady output of about 200 tons.

The British America Corporation.

The Hon. C. H. Mackintosh, Mr. W. A. Carlyle, Mr. D. J. Macdonald, and other leading representatives of the Corporation meet in Rossland in conference next week, and, as a result, important immediate developments of the Corporation's plans may be expected.

LOWER CALIFORNIA.

The California Asphaltum company of Ventura has a lease on the great sulphur mines on the Cocopah desert, near the Hardy Colorado, says the San Bernardino Transcript. This is perhaps the greatest deposit of sulphur on the western continent, if not in the world. Conservative estimates place the amount in sight at 3,000,000 tons. About 40 men are regularly employed and the output is mostly shipped to the asphalt company's works in Ventura county. A light railroad will soon be built from the mines to the river landing, twelve miles, to lower the cost of transportation.

MEXICO.

The Colorado Iron Works Company, of Denver, Colo., recently shipped two carloads of machinery to old Mexico, one car being water jackets for the Great Central Mexican Smelting Co., of Aguas Calientes, Mexico, and the other car constituted amalgamating machinery for the La San Gonzalo M. & M. Co., Gabriel, Mexico.

GENERAL NEWS.

Mining Patents.

Messrs. Townsend Bros., Solicitors of Patents, 9 Downey Block, Los Angeles, Cal., report the following list of recent patents of interest to mining men.

April 12, No. 602,221. Portable Crushing Mill. Henry L. Jessen, Watsonville, Cal. Filed April 6, 1898. This comprises crushing rolls mounted upon wheels in combination with a bucket elevator which is operated from the crushing-rolls and raises the material up opposite an adjustable gate, the parts being so arranged that the speed of the elevator determines the centrifugal force of the material discharged at the top and the adjustable gate regulates the amount of material admitted to the rolls in proportion to the speed of the rolls.

April 12, No. 602,113. Gold Separating Machine. B. W. Sweet, Knoxville, Tenn. Filed July 14, 1897. The combination includes an inclined traveling concentrating-table, an Amalgamating-plate and an amalgamating-roll stationed at the head of the table, and an amalgamating-roll at the tail end of the table, for receiving the heavier and lighter grades of gold.

April 12, No. 602,400. Ore-Roasting Furnace. H. Harlan, Richmond, Virginia. Assignor of one-half to S. D. Cranshaw, Henrico County, Va. Filed Nov. 10, 1897. A closed heating or roasting chamber, bars underneath the same to support the ore and spaced apart to admit air from below, an outlet flue at top for conducting the gas to the condensing-chamber, and a series of hollow air conduits resting on the bars over the air openings and consisting of vertical pyramidal shaped casings with smooth sides provided with perforations whereby air is admitted to the ore at the top and the sides of the conduits.

April 12, No. 602,250. Ore-Sorter. J. Angel, Paris, France. Filed Sept. 30, 1897. Patented in France Mar. 11, 1897. A series of chutes are arranged to receive the ore particles according to their size, each chute provided with a screw-conveyor, a vented chamber below the chutes, a conveyor arranged in said chamber, compartments behind the vertical conveyor, and a suction-fan producing a current whereby the vertical screw conveyors are caused to revolve and deposit the particles of ore in said compartments according to their density.

April 19, No. 602,526. Composition for Extracting Gold from Refractory Ores. A. G. Stephens, Colorado Springs, Colorado. Assignor of one-half to W. Whelan, same place. Filed Nov. 6, 1897. A composition to form a chloride of gold from which the gold in bullion can be obtained by any suitable means, consisting of water, 500 gallons; chloride of lime, 500 pounds; bromide of potassium, 500 ounces; nitric acid, 15½ gallons; muriatic acid, 31¼ gallons.

The Lunkenheimer Company, of Cincinnati, Ohio, has just issued a catalogue descriptive of the brass and iron valves, injectors, whistles, lubricator, oil and grease cups and steam specialties. During the past year the Lunkenheimer Company have made many important additions to their plant, in the way of new machinery and buildings, and at the present time they have unequalled facilities for manufacturing the various articles described in their catalogue, also special work of like character. Their branches in New York and London are in position to give the trade in their vicinity prompt attention.

"Ludlow Asphalt Sheathing."

The "Ludlow Asphalt Sheathing" is especially adapted for lining water flumes, cold storage houses, or any building where a uniform temperature is required, or moisture excluded.

It is made of the highest grade of Alcatraz Rock Asphalt over 90 per cent pure, contains no petroleum or disintegrating substance, emits no odor that is at all detrimental to the most delicate food or fabric. This material is made by passing a heavy eight-ounce burlap through hot asphalt which saturates every fibre and leaves a coating on each side. This is done after all the volatile oils and moisture have been taken from the asphalt. Write to the Ready Rock Asphalt Roofing Co., Los Angeles, Cal., for particulars.

One of the brightest, newsiest and cleanest printed papers in Southern California is the San Bernardino *Transcript*. It devotes a liberal amount of space to the mining industry, and should be appreciated and supported by all the miners of San Bernardino county, if they want the latest mining news. We extend a hearty reception and wish the *Transcript* a prosperous and untroubled journey to success.

The *Morning Mirror*, published at Bakersfield, Kern county, Cal., began its troublous journey through life Wednesday, March 30, 1898. The *Mirror* is edited by T. D. Van Devort, the former manager of the *Johannesburg News* and J. Mills Davies, is the associate editor and business manager. The *Mirror* is a handsome sheet, full of the latest news, and contains a liberal amount of mining news. The only paper in Kern county that gives the Associated Press dispatches to its readers is the *Morning Mirror*, published every morning in the week except Monday.

Lubrication of Gas Engine Cylinders.

The proper lubrication of gas engine cylinders has been a very difficult problem. The problem, however, has been very successfully solved by an official of the Pennsylvania Railroad Co. He writes as follows:

"I had a gas engine at Sharon, Pa., running a pump, and the man who had charge of it allowed the lubricator to run dry and cut the piston, piston rings and cylinder. The makers of the gas engine said the cylinder would have to be sent to the shop and bored out and a new piston put in. It was our busy season and we could not do without water. I had some of Dixon's finely pulverized graphite, and I commenced to feed it into the cylinder through the suction pipe with the air and gas with immediate relief. After about two weeks, the engine was running smoother and using less gas than ever before.

"I had this same engine apart last Saturday, and every part that was cut was smooth as glass. This one instance saved us about \$75.00. I have great faith in this graphite and always keep it on hand."

A pamphlet issued by the Murray Iron Works Company of Burlington, Iowa, illustrates five different styles of their high pressure tubular boilers. The return tubular is the most serviceable, economical, durable and generally satisfactory type of boiler that has been as yet designed. It is necessary to have properly fitted shops to rivet first-class boilers, and the Murray Iron Works Company has one of the most powerful hydraulic riveters in the country, and they know how to build high-pressure boilers.

THE BARTLETT CONCENTRATOR.

The Bartlett Concentrator is a Colorado machine lately invented by F. L. Bartlett of the American Zinc Lead Company at Canyon City, Colorado. A machine four feet by eight feet has a capacity of 10 to 30 tons per 24 hours, and weighs 750 pounds.

It is not necessary to size the ore before working with this concentrator, as it takes ore without sizing.

Can be set up anywhere, as it requires no special foundation and only needs an ordinary mechanic to do the work, which can be accomplished in two hours.

One-half horse power is required to operate this concentrator and it separates all the minerals from each other at one operation. Takes off the fine material first before too much water is applied and can be adjusted while running.

The following points are covered in the patent specifications:

First. Dividing the table into three or more descending shelves with regulated water supply for each division, and return spouts for the ore.

Second. The use of certain triangular grooves having decreasing areas towards the discharge end.

Third. The use of sliding triangular trays whereby the ore is cut off from the tailings.

Ore is fed at end of first shelf, traverses the



THE BARTLETT CONCENTRATING TABLE.

length of the table in triangular grooves, gradually decreasing in area, water being applied along the sides. Tailings work over into return trough and are carried to beginning of second shelf, traverse this with increased flow of water, returns again to third shelf and receives still more water, making 24 feet of travel for the ore before finally discharged, or three concentrations on the machine, with adjustable clean water supply for each concentration. Sliding trays at end of each shelf allow the ore and tailings to be cut off at any point, and complete separation to be made of the different minerals.

On account of the great diversity of the F. M. Davis Iron Works Company's business, the main specialty of which for the past twenty-five years having been the manufacture of machinery and apparatus for mining and milling ores containing the precious metals, they issue a catalogue, No. 18, especially to illustrate and describe the machinery and appliances manufactured by them for the milling of gold and silver ores.

Their catalogue, No. 18, just issued, contains a great deal of useful information, is well and comprehensively gotten up, and is printed on first-class book paper. One of these catalogues will be mailed upon application to the F. M. Davis Iron Works Company of Denver, Colo.

PERSONAL NEWS ITEMS

H. R. TAYLOR, of John Taylor & Co., the assayers supply house of San Francisco, Cal., was one of the visitors of the JOURNAL the fore part of the month.

B. F. FOLLETT of Leadville, an old-time ore buyer and mining man, has come to California on a pleasure trip.

LRO VON ROSENBERG, a New York mining engineer, is in San Francisco, Cal., on important mining business.

THOMAS F. WALSH, owner of the Camp Bird mine in Ouray county, Colo., has been spending some time in Washington, D. C.

DIEGO ESCALANTE has been appointed by the government of Mexico to the post of mineral agent for the Hermosillo district, of Sonora.

H. W. FAIRBANKS has returned north to Berkeley from a reconnaissance of the Southern California oil fields.

GARDNER WILLIAMS, general manager of the Kimberly diamond mine, South Africa, is in New York on his way to San Francisco, Cal.

W. J. SHARWOOD of the University of California, has taken a position as chemist to the Montana M. Co.'s cyanide plant, Marysville, Montana.

DR. F. M. ENDLICH, the well-known metallurgist of Los Angeles, is at present in La Paz, Lower California, Mexico, where he has been for some time on professional business.

The Kansas City Consolidated Smelting and Refining Company has sent an engineer to Mazapil to examine certain mining properties.

F. M. JEFFERY, one of the leading mining attorneys of Cripple Creek, Colorado, has recently located in Los Angeles, and can be found at 212 Wilcox Building, corner Second and Spring streets. Mr. Jeffery has for five years past lived in Cripple Creek and is recognized as an authority on mining law, he having been attorney for several of the large mining companies in the Cripple Creek District.

T. A. RICKARD, State Geologist of Colorado, having returned from Western Australia, has resumed his professional work in the United States, with his office as heretofore at Denver. He has engaged EDGAR RICKARD as his assistant.

WILLARD L. MORSE, for the past two years general manager of the Huantla Santa Ana Mining Co., Huantla Morelos, Mexico, has been appointed assistant general manager of the various smelting and mining companies owned by Messrs. M. Guggenheim's Sons in Mexico.

WYTHE DENBY, formerly mining engineer of the Arizona Copper Company, Limited, has been appointed superintendent and general manager of the Jualin Mining Co.'s property in Juneau, Alaska.

FRED DUCLOS, manager of the Mexican Ore Company, last month gave out the following figures showing the monthly ore shipments from Chihuahua for 1897:

January, 2,289,785 lbs.; February, 3,541,833 lbs.; March, 7,356,089 lbs.; April, 14,433,869 lbs.; May, 11,034,089 lbs.; June, 8,115,265 lbs.; July, 9,634,322 lbs.; August, 10,533,204 lbs.; September, 14,776,530 lbs.; October, 13,945,065 lbs.; November, 28,463,260 lbs.; December, 19,731,602 lbs.

Our issue of June 1st, 1898, will contain a lengthy and comprehensively written description of the Connellsville, Pa., Coke Region, its resources, possibilities and past production, including an historical sketch from the beginning to the present time. The Souvenir number of the *Connellsville Courier* has been drawn upon for information and the H. C. Frick Coke Company, which represents the big end of the coke trade of that region, have very kindly loaned us the cuts used to illustrate the article. Don't miss it; it is interesting!

OBITUARY.

MELVILLE ATTWOOD, an assayer and metallurgist, died at Berkeley, Cal., recently. He was born in England, but became one of the pioneers of the Pacific slope. He had an office at Grass Valley at the time the Comstock lode was discovered in 1859, and made the first positive determination of silver found in Nevada, and demonstrated the richness of the Comstock. He was the inventor of a method of amalgamating gold ores, ranked high as a microscopist, and was considered an authority on placer mining and gold milling.

THE MARKETS.

NEW YORK, May 12th, 1898.

The following are the Silver, Copper and Lead quotations for the last two weeks.

	SILVER	COPPER	LEAD
April	29	11 75	3 60
"	30	11 87 1/2	3 60
May	1	11 87 1/2	3 60
"	2	11 87 1/2	3 60
"	3	11 87 1/2	3 60
"	4	11 87 1/2	3 60
"	5	11 87 1/2	3 60
"	6	11 87 1/2	3 60
"	7	11 87 1/2	3 60
"	8	11 87 1/2	3 60
"	9	11 87 1/2	3 60
"	10	11 87 1/2	3 60
"	11	11 87 1/2	3 60
"	12	11 87 1/2	3 60

The market has been a rising one, owing to good eastern demand, and only moderate supplies offered. The French tender for 275,000 has been an additional impetus to the advance, which for the present has culminated at 26 7/16d.

The United States Office in New York reports the total receipts of silver at 192,000 oz. for the two weeks ending April 30.

COPPER.

Business continues to be very irregular but the undercurrent remains strong and there is a continued good demand for spot copper. The first shipments of Lake copper are due to arrive at consumers' places early next week, and that will materially relieve scarcity in spot delivery. There does not appear to be any sellers at 12 1/4c. Electrolytic copper quoted 11 1/4c. for cakes, wirebars or ingots, 11 1/4c. for cathodes, 11 1/4c. Casting copper is nominal at 11 1/4c.

LEAD.
A considerable demand has sprung up from various quarters, and there was rather a scramble to secure lead for May and June shipments. Consequently rather higher prices have been asked, and we have to quote 3.70 New York, while in St. Louis business took place at from 3.50 to 3.60.

SPELLER.
Spelter has been weak and declining; consumers' orders have fallen off, and with the present very large production, stocks quickly accumulate. The St. Louis market declined to 4c @ 3.97 1/2, while in New York 4.20c. has been accepted.

ANTIMONY.
Antimony continues strong, and we quote Cookson's 8 1/2c.; Hallett's and U. S. Star at 8 1/2c. and Japanese, 8c.

NICKEL.
Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33 1/2c. and 36c per lb and for smaller orders 35 1/2c. and 38c.

TIN.
Tin is in very good demand for spot and nearby delivery. Still, quotations remain steady, and we quote 14 1/4c. for spot, and \$14.45 for futures.

PLATINUM.
Prices are now quoted at \$15 and \$16 per oz., New York. The London quotations are 58 @ 60 s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal, Messrs. Eimer & Amend of New York furnish the following quotations: In lots of 250 grams or more, 56c. per gram; in lots of

100 grams or more, 57c. per gram; less than 100 grams, 58c. per gram; unmanufactured platinum will be supplied in same quantities at 2c. less per gram.

QUICKSILVER.

The New York quotation are at \$7.50 per flask.

The London price is £7 1s. 3d. per flask, with £7 quoted from second hands.

POWDER.

The market at San Francisco is fine with the current quotations.

The quotations are as follows:
For Hercules No. 1, from 11 1/4c. to 17 1/4c., according to strength and quantity. No. 2, from 9c. to 11c., according to strength and quantity.

COKE.

The market at San Francisco, Cal., is quoted as follows:

English, spot, in bulk	\$11.00
" " " " " "	12.00
Cumberland	10.00

BORAX.

The San Francisco market in Borax is firm with a good demand.

The market is quoted as follows:
Refined, in carload lots, in barrels 2 1/4
Refined, in carload lots in sacks 2 1/4
Powdered, in car lots 2 1/4
Concentrated, in car lots 6 1/4

THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum:	
No. 1, 98 per cent. Ingots, per lb.	34 3/4c
No. 2, 90 " " "	31 3/4c
Rolled sheets, per lb.	38 up
Aluminum-Nickel, per lb.	32 1/2c
Bismuth, per lb.	38 3/4c
Phosphorus, per lb.	40 3/4c
Tungsten, per lb.	70c
Pero-tungsten, 60 per cent	6c

Variations in price depend chiefly on the size of the order.

CHEMICALS.

Few orders are being booked, though deliveries on standing contracts have been large this week.

Quotations generally are as follows:
CAUSTIC SODA.
Quotations for Caustic soda domestic high test are \$1.60 @ 1.55 per hundred lbs.

ALKALI.

Domestic, 58 percent., 45c. @ 50c., foreign 45c. @ 50c. from dock as to style of package.

CARBONATED SODA ASH.
58 per cent., 90c and 95c. per 100 lbs. basis 48 per cent.

BI-CARBONATE OF SODA.
English, \$1.75 and \$2.12 1/2 per 100 lb. American, bulk \$1.25 and \$1.50 per 100 lbs. according to brand.

SAL-SODA.
For domestic, 50c. per 100 lb., less usual discounts; English, 62 1/2c. and 65c. Concentrated sal-soda, \$1.35 and \$1.60 per 100 lbs.

CHLORATE OF POTASH.
Chlorate of potash is quoted at \$8.35 and \$8.50 per 100 lbs.

Acids.

The market for the following acids lacks interest; has practically been at a standstill, through prices are pretty steady and hold up well.

Prices are per 100 lbs. in New York and vicinity in lots of 25 carboys or over. Quotations are as follows: Acetic acid, commercial No. 8 \$1.40 @ \$1.55, redistilled, 28 per cent., \$2.00 @ \$2.15, Muratic acid, 16 per cent., 1.10 @ \$1.75, 20 \$1.20 @ \$1.80, 22 \$1.35 @ \$2.25.

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Courses in Civil, Mechanical, Electrical and Mining Engineering, Metallurgy and Chemistry. Also Classical and Literary Courses. For further information, and for Registers, address, The Secretary of Lehigh University, South Bethlehem, Pa.

SAVE MONEY! FUEL COSTS MONEY

Protect your pipes and boilers with Wm. Herkfeldt's Fuel meal composition, packed in sacks, easy to transport anywhere. Send for facts and figures.
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"Phone Brown 313"

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SMITH & IRVING,
(FORMERLY, W. T. SMITH & CO.)

Gold Refiners and Assayers.

Our silver amalgam for replating copper plates is being extensively used by millmen. It avoids the necessity of sending plates long distances to be replated. For sale in small quantities, 50c per ounce, a reduction being made on all orders over 20 ounces. Experience proves our silver amalgam will catch more gold than when the copper is electroplated. Our Mr. Smith owned and operated Smelting, Refining and Chemical works in Providence, R. I., for over 20 years.

128 N. Main Street Los Angeles, Cal.

BELTING Leather, *
Cotton, ALSO—
Rawhide, etc. Lace Leather
L. P. DEGEN, Manuf'r

Agent for Rubber Belting, Hose and Packing. 105 and 107 Mission Street, San Francisco, Cal.

PERFORATED SCREENS
Steel Plate, Copper and Bronze
For all uses. Send for Catalogue
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Works Garwood, N. J.



LARGEST GASOLINE PUMPING PLANT IN THE WORLD

The illustration shows the gigantic pumping plant recently built by the Hercules Gas Engine Works in the Packer Ranch, Colusa Co. 80 h. p. Hercules Engine, pumping 7200 gallons a minute, 27 feet high. Burns Gasoline or Distillate oil. Cheapest power known. Gas, Gasoline and Oil Engines, 2 to 200 h. p. Send for Catalogue. HERCULES GAS ENGINE WORKS, 210 Bay St., San Francisco.

Hoskins' Patent Hydro-Carbon

Blow-Pipe and Assay Furnaces

No dust. No ashes. Cheap, effective, economical, portable and automatic. Send for Price-list to

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81 South Clark St., Room 57
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J. B. JARDINE

HAS THE FOLLOWING
FOR SALE: Second-Hand 10 Stamp Mill Complete.
Second-Hand 14-24 inch Corliss Engine.

311 Folsom Street, San Francisco, Cal.

Chas. P. Grimwood,
Mining Engineer and Metallurgist

Laboratory, 214, Pine Street

SAN FRANCISCO, CAL.

according to make aid quantity. Nitric acid, 36°, \$3.10 @ \$1.15, 38°, \$3.75 @ \$4.62½; 40° \$4.00 @ \$4.12½; \$4.12½ @ \$5.25. Oxalic acid, \$6.50 @ \$7.00. Mixed acids, according to mixture. Sulphuric acid, 66 per cent., \$1.10 @ \$1.75. Chamber acid, 50° \$1.50 @ \$1.2 per ton at factory. Blue Vitriol, \$3.50 @ \$4.00 according to grade and order.

BRIMSTONE.

Demand continues moderate. No rivals are noted, and prices are about as last quoted. Best unmixed seconds, \$37.50 for spot, while thirds are \$36.00 per ton, respectively.

MURIATE OF POTASH.

We quote per 100 lbs. on basis of 80 per cent., as follows: New York and Boston, \$1.75 for 80@85 per cent., and \$1.78c. for 95 per cent.; Norfolk and Philadelphia \$1.76½ for 80@85 per cent., and \$1.79½ for 95 per cent.; Charleston, Savannah, Wilmington, N. C. and New Orleans, \$1.78½ for 80@85 per cent., and \$1.81½ for 95 per cent. All for lots of 50 tons and upward.

RAINF.

Invoice weights as taken at port of shipment per ton of 2,240 lbs. testing 12.4 per cent. actual potash, equivalent to 23 per cent. sulphate of potash, \$8.55 for New York and Boston; \$8.90 for Norfolk, and \$9.05 for Charleston. Savannah, Wilmington, N. C., and New Orleans. Actual weights, ex vessel at port of importation are quoted \$8.80, \$9.15 and \$9.30, respectively.

NITRATE OF SODA.

Market is still high, and sales of spot nitrate are quoted at \$1.95 @ \$2, but quotations are up to \$2 per 100 lbs; futures range from \$1.75 upward.

FINANCIAL NOTES.

The statement of the United States Treasury, on Thursday, April 28th, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date last week:

	April 21	April 28	Changes.
Gold.....	\$180,013,500	\$180,612,008	L. \$597,508
Silver.....	4,445,000	5,977,811	D. 1,532,811
Legal tenders.....	11,255,235	31,757,576	D. 20,502,341
Treasury Notes.....	3,241,000	3,279,917	L. 38,917
Totals.....	\$223,013,735	\$223,620,302	D. \$506,567

Treasury deposits with national banks amounted to \$28,334,971, a decrease of \$964,205 during this week.

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1898, and for the years 1897 and 1896:

Month	1898	1897	1896
January.....	60.77	61.79	67.77
February.....	60.07	61.67	67.77
March.....	61.90	63.06	68.16
April.....	61.02	61.85	67.92
May.....	60.42	60.42	67.75
June.....	60.10	60.10	68.69
July.....	59.51	59.51	68.77
August.....	59.49	59.49	67.75
September.....	59.21	59.21	65.85
October.....	57.67	57.67	66.05
November.....	57.91	57.91	64.91
December.....	58.11	58.11	55.21
Year.....	60.79	60.79	67.75

Gold and Silver Exports and Imports.

At all United States ports, March, 1898, and years from January 1st, 1898 and 1897

	Coin and Bullion Exp.	Imp.	In Ores Exp.	Imp.
Gold—				
March.....	\$68,834	\$30,200,765	\$69,873	\$471,713
1898.....	4,244,490	41,151,920	75,341	7,712,713
1897.....	1,280,709	1,885,487	80,998	1,046,998

Silver—

March.....	3,995,818	445,352	7,695	1,768,899
1898.....	12,011,545	1,369,701	51,830	5,419,348
1897.....	13,573,800	2,120,239	246,700	4,692,264

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

The gold exported for the week this year went to the West Indies, the silver chiefly to London. Of the gold imported \$3,627,527 came from England, \$2,626,704 from Germany, \$1,289,500 from Havana, West Indies, \$188,174 from France, \$400,000 from Italy, and the remainder, together with the silver, from Central and South America.

Shipments of silver from London to the East for the year up to April 14, are reported as follows:

	1897	1898	Changes
India.....	\$1,501,950	\$2,151,200	L. \$649,250
China.....	44,512	239,396	L. 194,884
The Straits.....	55,993	94,064	L. 38,071
Totals.....	\$1,602,455	\$2,485,380	L. \$882,925

The exports of Mexican dollars was very light this year, having been \$35,464 in March, and \$621,893 for the three months against \$184,238 and \$1,427,149 respectively in 1897.

Imports of gold are suspended for the present, and no additional takings of gold abroad are reported this week. The banks are reducing their loans somewhat and are providing for the calls which will be made should a Government issue be offered soon.

POSITIONS WANTED

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, to all paid-up annual subscribers. Other than above \$1.00 per month will be charged. Advertisements not accepted for less than one month.

WANTED, by a young experienced man, position as quartz mill man, one who can keep mill running.
Address, A. E. CHARLESWORTH, LOCKPORT, CAL.

WANTED, by a young man, a position as Assayer, etc.; experienced, competent and has a good knowledge of all metallurgical operations. Good references.
Address, T. K. JOURNAL OFFICE, Stinson Block, Los Angeles, Cal.

WANTED—An experienced Engineer with practical knowledge of management of dynamos and electric lights. Also wanted an Assayer with practical knowledge of silver metallurgy. Address with references.
VERKOL MINING CO.,
Verkol, Arizona

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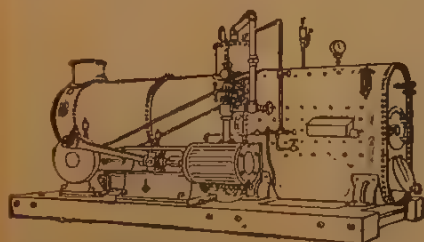
I HAVE some good gold mining properties for sale at reasonable prices, some developed and some real good properties at Ward, Eldora, Gold Hill, Jamestown, Magnolia, Caribon and Sugar Loaf. Write stating what you want or call on me.
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Chemist to the Board of Health of the City of Spokane. All Assays guaranteed to check with United States Mint.

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The Graphite Lubricating Company BOUND BROOK, N. J.

Sulphuric Acid

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Cash Returns Made Within Twenty-four hours after receipt of Ore.

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Johannesburg, Cal.

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Iron and Brass Castings of all kinds, Shoes and Dies, Pumps, Engines, Boilers, Stamp Mills, etc., etc. Machinists and Foundrymen.

Standard Iron Works, PHOENIX, . . . Arizona

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Geologist and Mining Engineer.

Mines Examined and Reported on. COLTON, CALIFORNIA

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COLTON, CALIFORNIA

Manufactured by the Western Chemical Co. Denver, Col. For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas Refined Sulphate of Soda, Etc.

MINING STOCK QUOTATIONS

BOSTON

Astoria Con	4 00	Humboldt	40 00
Allouez	—	Illinois Steel	17 00
Anacosta	—	K. & N.	—
Arnold	3 00	Lake Sup. Iron	4 75
Atlantic	22 00	Mered	5 00
Bonanza	—	Napa Con	8 50
Boston and C. C.	—	New Idria M.	—
Boston & Mont.	135 1/2	Old Dominion	20 25
Butte & Boston	20 25	Oreocla	34 50
Calumet & Hecla	450 00	Pioneer	5 00
Calumet	—	Quincy	110 1/2
Centennial	15 50	Ridge	—
Central	—	San Yacobi	—
Dillon on Cal.	21 50	Lamarck Jr	—
Dominion Prof.	14 00	Lamarck	125 00
Franklin	—	Tecumseh	3 00
Gold Con	2 00	Wolverine	16 00

NEW YORK

Alamo	03	Iron Stake	29 50
Alice	40	Iron Silver	—
Annetta	45	Mexican	30
Best & Belcher	60	Mottie Gibson	19
Bran swick	05	Ontario	4 50
Bulwer	—	Opbir	—
Crown Point	85	Pharmaceutical	10
Con. Cal. & Va.	—	Plymouth	—
Cripple Creek Con	08 1/2	Quicksilver	3 00
Deadwood	—	Quicksilver pld	11 00
Favorite	11 25	Sierra Nevada	—
Fortuna	—	Standard	1 60
Golden Pledge	04	Union Con	—
Gold & Curry	45	Yellow Jacket	—
Hale & Norcross	—	—	—

COLORADO SPRINGS STOCKS

Alamo	03 1/2	Inabella	30
Anacosta	45	Iron	—
Argentum Juanita	20	Jack Pot	05 1/2
Bankers	04 1/2	Jefferson	08 1/2
Ben Hur	02 1/2	Mottie Gibson	23
C. K. & N.	00 1/2	Mount Rosa	—
C. C. & Manitou	02	Pharmacist	08 1/2
Crede & C. C.	02	Portland	70
C. C. Consolidated	09	Peoples	02 1/2
Garfield Grows	04	Sacramento	02
Golden Pledge	30	Star of the West	—
Gold & Globe	—	Union Gold	22
Gold Standard	05 1/2	Virginia M.	02 1/2
Insley	300	Work	05
Pionier	04 1/2	—	—

LOS ANGELES, CAL.

Amargosa	05	Magganetta	01 1/2
Brown Lake	07 1/2	Mohawk Action	1 25
East Armagosa	1 50	Old Dominion	03
Empire Copper	25	Pacific Con	1 50
Gold Bug	5 00	Rand Mt.	2 50
Iron Mt.	02	Sun Dance	40
Lavrel Mt.	02 1/2	Val Verde	1 50
Little Butte	15	Wedge	09 1/2
Lucky Star	5 00	—	—

SAN FRANCISCO.

Alpha	—	Exchequer	—
Alta Con	10	Gould & Curry	24
Andes	24	Hale & Norcross	55
Belcher	23	Justice	28
Best & Belcher	35	Mexican	28
Bodie	—	Ophir	80
Bullion	10	Overman	45
Challenge	26	Potosi	28
Chollar	50	Savage	57
Confidence	85	Sierra Nevada	30
Con. Cal. & Va.	1 0	Union Con	30
Con New York	—	Utah	07
Crown Point	17	Yellow Jacket	03

SALT LAKE CITY

Alice	55	Lucky Bill	—
Ajax	39	Malvera	—
Alliance	16	Mammoth	1 92 1/2
Anchor	50	Maxfield	—
Buckeye	02	Mercur	8 12 1/2
Bull. Beck	5 40	Morgan	—
Cent. Rureka	25 00	Northern Light	23
Chloride Point	02	Omaha	—
Dalton	03	Ontario	3 50
Daily West	4 00	Oversand	80
Dalton & Lark	02 1/2	Richmond Ana.	—
Dexter	1 25	Rover	15
Eagle	05 1/2	Sacramento	57
Eureka Hill	—	Silver King	16 75
Four Aces	06 1/2	Sioux Con	—
Galeana	64	Sunbeam	07 1/2
Gemini	—	Sunshine	30
Geyser-Marion	98 1/2	Swansea	2 15
Grand Central	2 55	Swansea	1 21
Homestake	01 1/2	Utah	85
Horn Silver	1 25	Utah Con	—
Little Pittsburgh	12 1/2	—	—

ROSSLAND, BRITISH COLUMBIA.

Alberta	05	Joia Mac	12 1/2
B. C. Gold King	07	Joia	35
Beaver	10	Jumbo	75
Big Three	10	Knight Templar	05
Blackbird	07	Konteney-London	10
Brice	16	Le Roi	8 00
Butte	01 1/2	Lilly May	18
Calderonia Con	05 1/2	Malch	15
California	15	Mayflower	10
Camp Bird	05	Montia	18
Goldie Queen	05	Monte Christo	18 1/2
Centre Star	—	Morning Star	03
Colonna	24	Mugwump	03
Commander	18	Near Egg	05
Deer Park	12 1/2	Northern Belle	10
Delta Colla	02	Novelty	09
Delaware	12	O. K.	10
Eastern Star	20	Pala Alto	05
Enterprise	20	Phoenix	13 1/2
Eric	03 1/2	Phoebus	10
Eureka Con	05 1/2	R. Lee	15
Evering Star	05 1/2	Red Eagle	06
Georgia	10 1/2	Red Mount. View	10
Gorluda	10 1/2	Red Point	10
Golden Drip	15	Ross'd Hamlet	05
Good Hope	03 1/2	Rossland, Red Mt.	20
Grand Price	03 1/2	St. Elmo	08
Great Western	08	St. Paul	12 1/2
Hattie Brown	—	Silver Bell	04
Helen	04	Silverline	06
High Ore	04 1/2	So Cross & W. Con	20
Imperial	10	Virginia	12
Iron Horse	20	War Eagle Con	10
Iron Mask	28	West L. Roi	21
J. K. L.	10	White Bear	11

DENVER STOCK REPORT.

Astoria	00 1/2	Elkton	82
Alamo	02 1/2	Eureka	00 1/2
Anacosta	42	Garfield Grouse	54
Arcadia	004	Golden Pledge	25
Consolidated	01 1/2	Goldsmith	00 1/2
Argentum Jun.	02 1/2	Gold Standard	02 1/2
Bankok-C-Bell	27	Inley	00 1/2
Bankers	04	Iron Clad	02 1/2
Ben Hur	02 1/2	Inabella	28 1/2
Bob Lee	04 1/2	Jack Pot	04 1/2
Boston & C. C.	01 1/2	Jefferson	08 1/2
Chimbarazo	002	Mollie Gibson	70
C. K. & N.	006	New Zealand	05 1/2
Coto, C. & M.	01 1/2	People's	01 1/2
C. C. Con	05 1/2	Pharmacist	08 1/2

HELENA, MONTANA

Am Den & M Co.	1 00	Helena & Frisco	8 00
Bald Butte	2 50	Iron Mountain	—

Bl-Metallie	—	Merrill	—
Combination	—	Ontario	—
Con T & P m'n.	35	Yellowstone	11
Diamond Hill	—	—	—

MEXICO

Name of Company	State	Price
Altamira	Hidalgo	5
Amatitlan y Concordia	"	24
Anguillas	Guantanamo	210
Arenito y Anexas	Hidalgo	200
Atzacatlan y Anexas	Zacatecas	210
Barrocan y Cabras	Durango	300
Barloome de Medina	Hidalgo	100
Cabezon y An	Zacatecas	20
Candelaria de Pinos	"	150
Candelaria de Panto	"	20
Candelaria de Chalch	"	80
Capizay	Durango	120
Carmen	Hidalgo	250
Castellana y San Ram	Tepe	80
Cerro Colorado	Chihuahua	10
Cinco Seores y An	Guantanamo	850
Concepcion y Anexas	S. Luis Potosi	280
Ki Oro	Guantanamo	40
Papantla y An	Mexico	1,300
Guadalupe	Guantanamo	100
Huautla	Santa Ana	150
Luz de Borda	Michoacan	40
Luz de Maravillas	Hidalgo	200
Pabellon	"	150
Palma	Zacatecas	150
Pavisa de los Com	"	5
Real del Monte	Hidalgo	600
Refugio y Va	"	8
Restauradora	Durango	50
Rosario y Anexas	"	60
San Francisco	Hidalgo	270
S. Ped. Chalechiltes	"	160
San Rafael y Anexas	"	925
do, Free Stock	"	400
San Rafael del Oro	Hidalgo	20
Sto. Martin de la Paz	S. Luis Potosi	730
Sirena	Durango	80
Solista	Hidalgo	400
Sorpresa	"	250
Triton	Guantanamo	40
Flauzingo	Puebla	27
Union	Hidalgo	280
Zacazona	"	15
Zemelabucan (gold)	Vera Cruz	100
Zona Min de Pozos	Guantanamo	15

NOTE—The above Mexican stocks are figured on the basis of Mexican silver.



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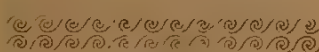
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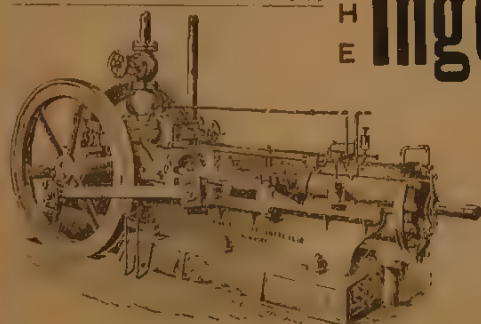
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INCORPORATED MINES PAYING DIVIDENDS.

NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of Last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
Aetna Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Sept 1897	\$ 100,000	Q
Adams	Colorado	15,000	1,000,000	10	01	October 1895	600,000	S, L
Alaska, Trendwell	Alaska	200,000	5,000,000	25	35 1/2	October, 1897.	1,200,000	G
Alaska Mexican	Alaska	200,000	1,000,000	5	10	Oct., 1897	200,000	G
Alice	Montana	400,000	10,000,000	25	03	Oct 1897	5,000,000	G
Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1897	12,000,000	G
Anaconda Leland	Colorado	800,000	800,000	1	01	Oct 1897	80,000	G
American Gold	Colorado	300,000	3,000,000	10	02	Aug 1897	25,000	S, L
Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1897	700,000	G
Bald Butte	Montana	250,000	250,000	1	03	Sept 1897	10,000	G, S
Bangkok C-Bell	Colorado	800,000	800,000	1	01	July 1896	10,000	S, L
Big Six	Colorado	500,000	500,000	1	00 1/2	April 1897	5,000	G, S
Boston & Montana	Montana	150,000	3,750,000	25	3 00	Aug 1897	6,000,000	G, S
Bullion Back and Champion	Utah	100,000	1,000,000	10	50	Mar 1897	2,000,000	G
Bunker Hill and S	Idaho	300,000	3,000,000	10	05	Oct 1897	20,000	S, L
Cariboo	British Col.	800,000	800,000	1	02	May 1897	1,000	G
C. O. D.	Colorado	51,000	500,000	1	01	March 1896	2,000	G
Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Oct 1897	50,000,000	G
Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,000,000	S, L
Central Lead	Missouri	4,000	400,000	100	1 00	Oct 1897	10,000	G
Charleston	South Car	10,000	1,000,000	100	1 00	Feb 1897	1,000	G
Champion	California	34,000	340,000	10	25	Aug 1897	25,000	G
Consolidated, California and Virginia	Nevada	210,000	21,000,000	100	25	March 1895	1,000,000	G, S
Copper Queen Consolidated	Arizona	200,000	2,000,000	10	25	June 1895	1,000,000	G
Crescent	Utah	24,000	800,000	25	...	July 1897	280,000	G
Daly	Utah	150,000	3,000,000	20	25	Mar 1897	2,000,000	S, L
Deadwood Terra	Dakota	200,000	5,000,000	25	40	June 1897	1,000,000	G
De Lamar	Idaho	400,000	2,000,000	5	25	Jan 1897	2,000,000	S, L
Della S	Colorado	1,000,000	1,000,000	1	10	Jan 1897	50,000	G
Doe Run	Missouri	5,000	500,000	100	50	October 1897	1	G
Dalton and Lark	Utah	2,500,000	2,500,000	1	00 1/2	August 1896	8,500	S, L
Elkton Consolidated	Colorado	1,250,000	1,250,000	1	03	Sept 1897	35,000	G, S
El Paso	Colorado	650,000	650,000	1	01	Aug 1897	5,000	G, S
Florence	Montana	500,000	2,500,000	5	01	May 1897	1,000	G, S
Galeana	Utah	100,000	1,000,000	10	05	Jan. 1897	70,000	S, L
Garfield Group	Colorado	1,200,000	1,200,000	1	01	Feb 1897	20,000	G
Geyser-Marion	Utah	300,000	1,500,000	5	03	Nov 1897	3,000	G
Golden Eagle	Colorado	1,000,000	1,000,000	1	01	Sep 1896	10,000	G
Golden Pines	Colorado	600,000	600,000	1	01	Feb. 1897	60,000	G, S
Gold Coin	Colorado	200,000	1,000,000	5	05	Aug 1897	150,000	G, S
Gr. Id and Gilje	Colorado	750,000	750,000	1	3-10	July 1897	3,000	G
Hecla Consolidated	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	G, S, L
Helena & Pisco	Idaho	500,000	2,500,000	5	04	August 1896	170,000	S, L
Higdon	S. Dakota	100,000	10,000,000	100	20	Oct 1897	1,000,000	G
Holy Ten	S. Dakota	300,000	300,000	1	03	Sept 1897	18,000	G
Honolulu	Dakota	125,000	12,500,000	100	25	Oct 1897	6,000,000	G
Hope	Montana	100,000	1,000,000	10	10	Nov 1897	732,232	S
Horn Silver	Utah	400,000	10,000,000	25	12 1/2	January 1896	5,000,000	S, L
Idaho	Brit. Col.	500,000	500,000	1	05	Mar 1887	152,000	G
Iowa	Colorado	1,000,000	1,000,000	1	00 1/2	Oct 1897	65,000	G
Iron Mountain	Montana	500,000	5,000,000	10	01	Sept 1897	497,500	S
Isabella	Colorado	2,250,000	225,000	100	00 1/2	June 1897	200,000	G
Kearns	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	G
Last Chance	Brit. Col.	500,000	500,000	1	04	Jan 1897	42,000	S, L
Le Roi	British Col	500,000	2,500,000	5	10	Oct 1897	625,000	G
Minnesota	Minnesota	165,000	16,500,000	100	50	July 1896	3,240,000	L
Montana Ore Purchasing	Montana	40,000	1,000,000	25	01	October 1897	610,000	G
Moose	Colorado	800,000	800,000	1	01	January 1896	180,000	G
Morning Star	California	2,400	240,000	100	8 00 1/2	Sept. 1897	558,600	G
Mt Rosa	Colorado	1,000,000	1,000,000	1	00 1/2	Oct 1896	0,000	G
Mercur	Utah	250,000	5,000,000	25	12 1/2	Oct 1897	8,000,000	G
Mammoth	Utah	400,000	10,000,000	25	05 1/2	Nov. 1896	1,000,000	G, S, L
Moon Anchor Gold	Colorado	600,000	600,000	1	02 1/2	Nov 1897	60,000	G
New Elkhorn	Colorado	300,000	1,500,000	5	24	Sep. 1896	12,000	G
New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	Oct. 1897	8,000,000	S, G
Napa	California	100,000	700,000	7	20	Oct 1897	800,000	G
New Idria Quicksilver	California	100,000	500,000	5	10	Sept 1897	20,000	G
Ontario	Utah	150,000	15,000,000	100	10	June 1897	13,000,000	S, L
Oscoda	Michigan	50,000	1,250,000	25	1 00	June 1897	2,175,000	G
Parrot	Montana	230,000	2,300,000	10	08	June 1897	1,000,000	G
Pennsylvania Consolidated	California	51,500	5,150,000	10	05	Sept 1897	20,700	G
Portland	Colorado	3,000,000	3,000,000	1	01 1/2	Oct 1897	1,160,000	G, S
Princess	Colorado	1,000,000	1,000,000	1	00	Feb 1897	45,000	G
Quincy	Idaho	100,000	2,500,000	25	4 00	August 1897	9,000,000	G
Rambler-Cariboo	Brit. Col	1,000,000	1,000,000	1	02	April 1897	10,000	G
Reco	Brit. Col	1,000,000	1,000,000	1	50	May 1897	50,000	S, L
Sacramento	Utah	1,000,000	5,000,000	5	00	March 1897	22,000	G
Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	Mar 1896	3,250,000	G
South Swansea	Utah	150,000	150,000	1	05	Oct 1897	59,900	S, L
Standard	California	200,000	20,000,000	100	10	Sept 1897	3,750,000	G, S
St. Joseph	Missouri	250,000	2,500,000	10	15	Oct 1897	21,000	L
Silver King	Utah	150,000	3,000,000	20	25	October 1897	1,200,000	S, L, G
Slocan Star	Brit Col	2,000,000	1,000,000	0.50	05	Mar 1897	50,000	G
Smuggler Union	Colorado	50,000	5,000,000	100	1 00	Oct 1896	150,000	G, S
Swatara	Utah	100,000	500,000	5	05	Oct 1897	61,000	S, L
Tam Boy	Colorado	200,000	2,000,000	10	20	March 1896	410,000	G
Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1897	1,000,000	G
Union	Colorado	1,250,000	1,250,000	1	01	June 1896	75,000	S
United Verde	Arizona	300,000	3,000,000	10	25	December 1893	562,000	G
Utah	Utah	100,000	1,000,000	20	02	Feb 1897	15,000	G, S
Utah Consolidated	Utah	30,000	150,000	5	02	Sept 1896	3,000	S, L
Victor	Colorado	200,000	1,000,000	5	10	March 1897	765,000	G
Western Mine Enterprise	Montana	500,000	500,000	1	10	Mar 1897	120,000	G
War Eagle	British Col.	500,000	500,000	1	05	October 1896	187,000	G

S, Silver.

G, Gold.

L, Lead.

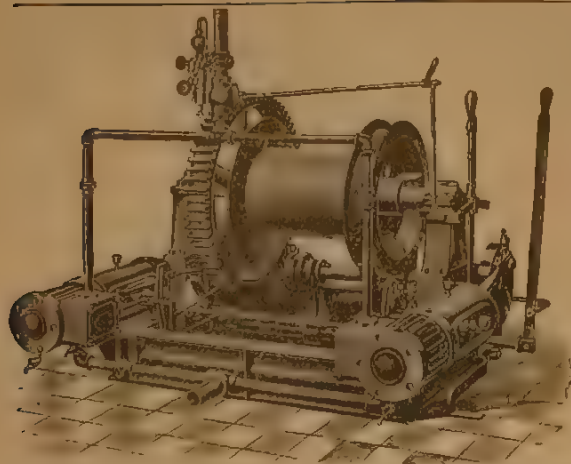
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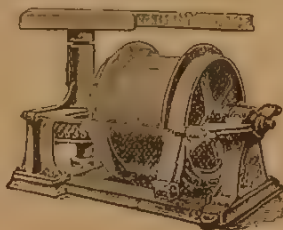
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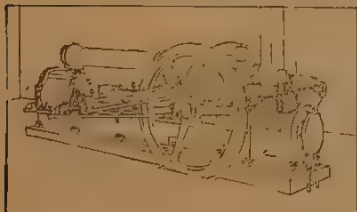
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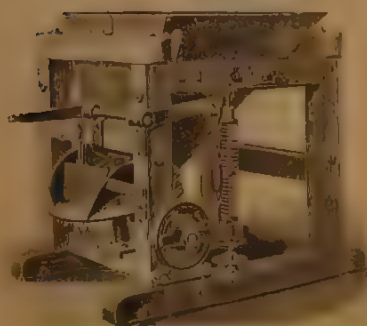
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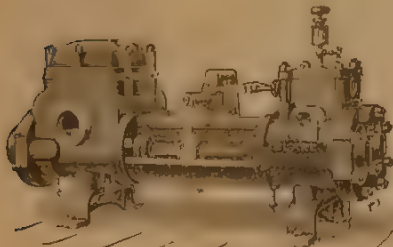
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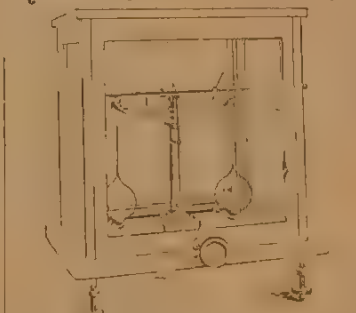
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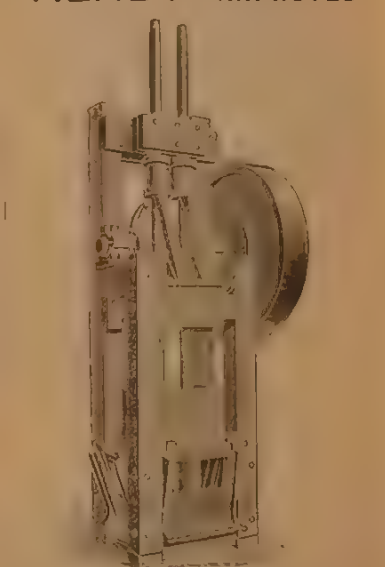
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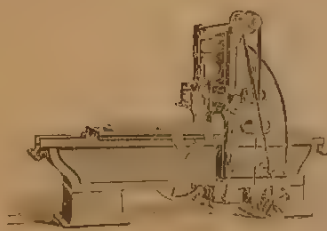
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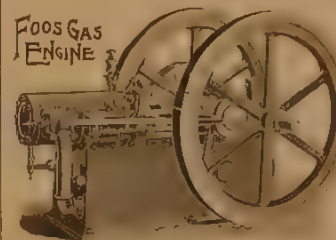
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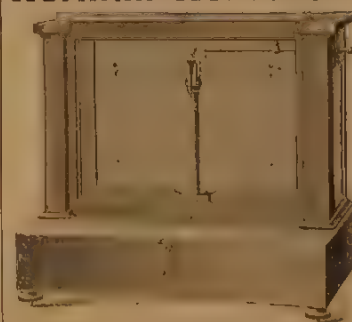
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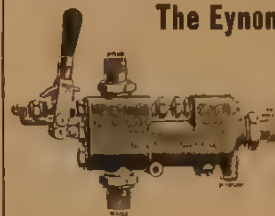
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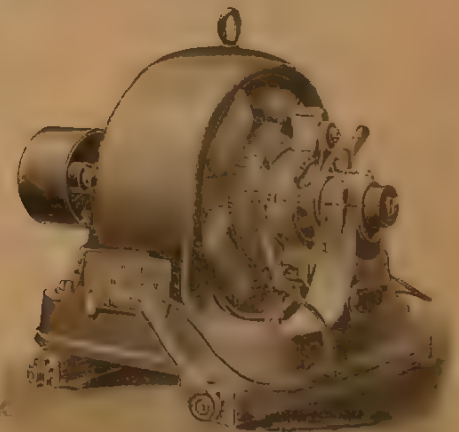
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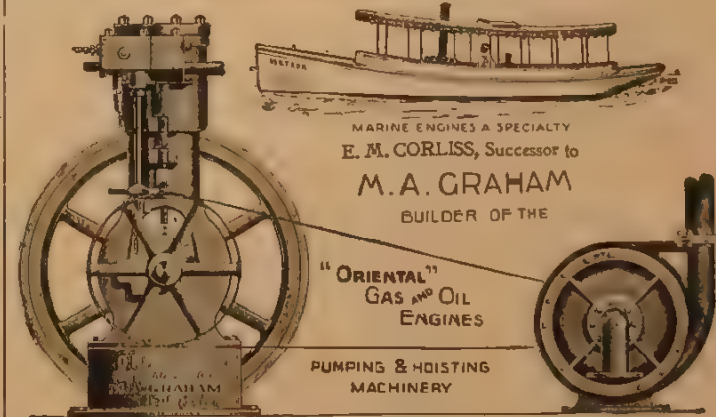
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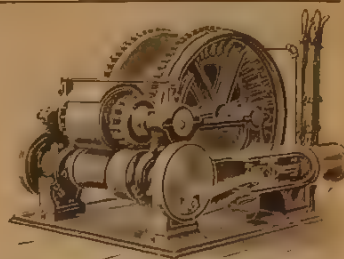
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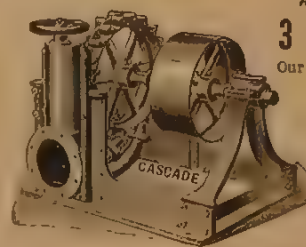
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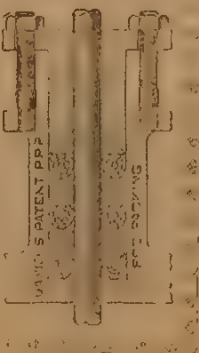
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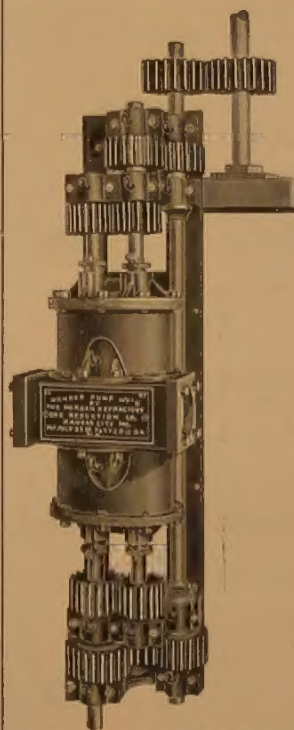
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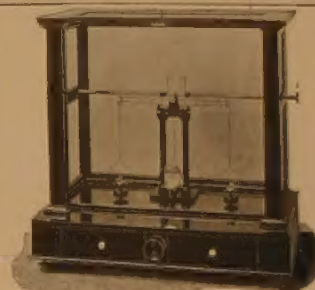
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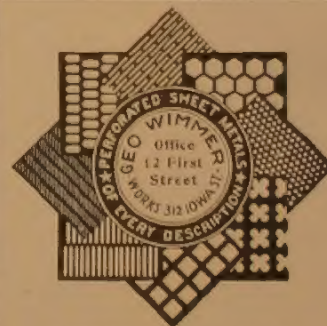
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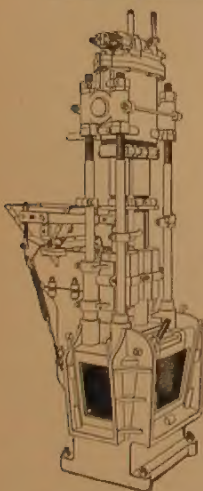
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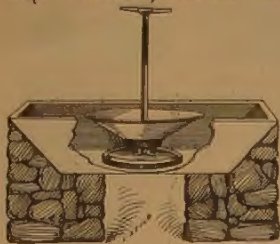
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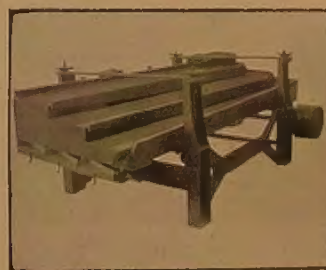
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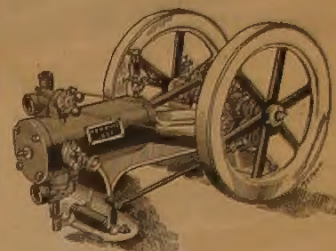
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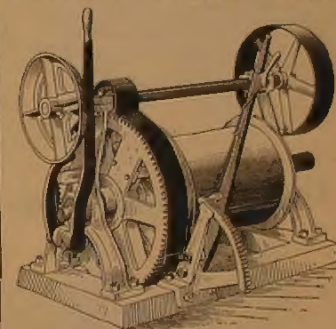
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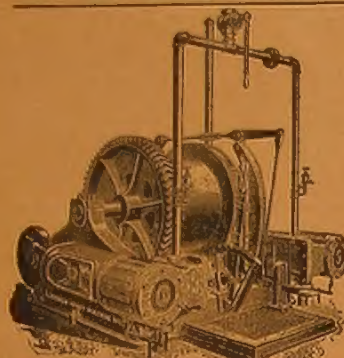
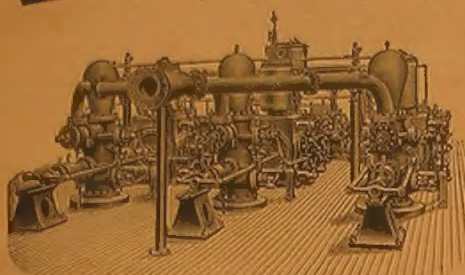
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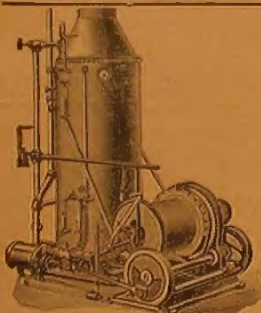
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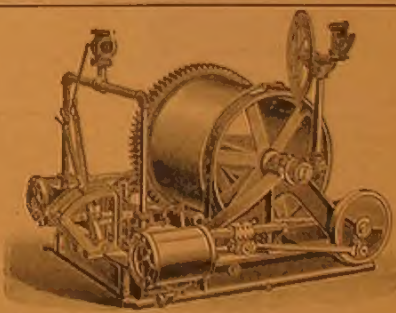
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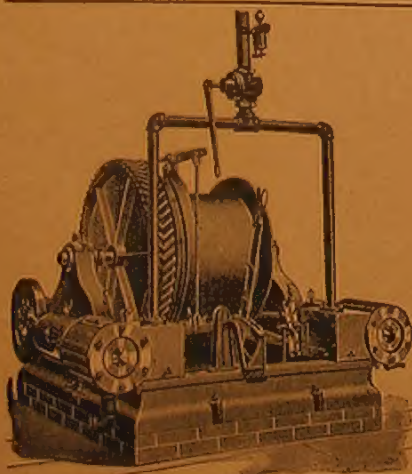
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